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<td>Rodis, Fotios</td>
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<td>掲載誌・巻号・ページ</td>
<td>Citation</td>
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<tr>
<td>21世紀倫理創成研究,13:54-73</td>
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<td>刊行日</td>
<td>Issue date</td>
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<td>2020-03</td>
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<td>資源タイプ</td>
<td>Resource Type</td>
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<tr>
<td>Departmental Bulletin Paper / 紀要論文</td>
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<td>版区分</td>
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PDF issue: 2021-11-05
1. Introduction: Aim and Issues

The aim of the hereby attempt is to provide an alternative philosophical framework in order to elaborate from what sustainability originates and how it could be instituted as a social value, as a parameter for the management of natural resources. The triggering questions focus on the topics, firstly, how sustainability emerges as a potential form of social instituting and, secondly, what are the fundamental properties essential to be instituted to attain sustainability for any social structure, beyond social differences. After all, even if the necessity of sustainability may seem obvious, still putting down social goals in exact words remains a challenge.

Primarily, the quest towards sustainability sets its rudiments on the correlation between natural laws and social principles. In that sense, environmental ethics are subsumed under the broader theme, concerning if and how physics transcend to metaphysics. Thus, this paper attempts to extract institutional reference points from natural laws and, afterwards, to distinguish how these findings are actually taken into account by societies. Specifically put on the field of environmental institutions, sustainability is expected to emerge through a leap from the principle of Conservation of Energy and the Entropy Law of the physical realm to social institutions on managing natural resources. Therefore, sustainability stands on the dipole between the finite capacity of accessible resources and the urge for economic growth.

To that end, this proposal is mainly based on three milestones: firstly,
that sustainability is understood as an institutional constraint, originating from natural boundaries; secondly, that scientific theories provide reference points for social instituting; and, finally, that sustainability transcends from Bioeconomics.

2. Sustainability as an institutional creation

2.1. The concept of social imaginary

Sustainability is initially incorporated as an institution. That being said, the ontological fundamentals for this project derive from the theories of Cornelius Castoriadis on the emergence of institutions as social creations.

Firstly, the ontological perspective of Castoriadis is grounded on the social significance of imagination. Fundamentally imagination is “the originary faculty (of human being) of positing or presenting oneself with things and relations that do not exist, in the form of representation” – else, “the elementary and irreducible capacity of evoking images” of something which does not exist and never existed in the natural world. Of course, even if the imaginary is “something invented” and thus separate from natural reality, nonetheless it is distinguished from pure illusionary fantasy. For imagination transcends as the source of social structuring and, as such, potentially depicts “a greater reality than the real itself”.

However, in order to conceptualize imagination from a social aspect beyond the individual level, the concept of social imaginary is introduced, under which is depicted the system of significations, the function of which constitutes and articulates the social world. This system “is operative in the practice and in the doing of the society considered as a meaning that organizes human behavior and social relations, independently of its existence for the consciousness of that society”, whereas “it cannot be accounted for by reality, by rationality, or by the laws of symbolism”. Hence, the Being is perceivable by humans only through social significations which cannot rationally be founded, nor nullified, while providing answers fundamental questions that every society poses.

Under the light of these standpoints, social imaginary bridges natural reality with social structure, the empirical with the non-empirical Being.
Concerning every social subject, the understanding of the outer World depends on social meanings, formed by the social imaginary. And albeit their deciding role on instituting and perceiving, they always remain non-material – thus, imaginary. Characteristic examples are social values, moral principles, common habits, legal rules etc.; all of these are indeed virtual, non-empirical, phenomena, yet they dominate our social interactions, while bearing even the capacity to alter the biological behavior, without changing its biological structure. That is the reason why social imaginary is a non-empirical state of reality, else a second nature, born by human imagination and constituting the living core of any society, despite respective differences.

As for environmental ethics, sustainability bears an answer to the contradistinction between industrial production and environmental consciousness. On this dipole, it is not imposed as a logical necessity, but as a doxa, a choice among the possible solutions.

2.2. Social institutions as creations ex nihilo

In Castoriadis’ ontology, social institutions constitute “a socially sanctioned, symbolic network”, which is used by the imaginary “not only to 'express' itself […], but to 'exist', to pass from the virtual to anything more than this”. In that sense, institutions, by fulfilling “vital functions without which the existence of society is inconceivable”, are perceived under the broadest possible meaning, ranging from religious notions and political-moral principles to working habits and food preferences. In such framework, sustainability emerges as a potential institution concerning the management of natural resources.

Subsequently, regarding their source, Castoriadis affirms that social institutions emerge as creations ex nihilo. That means, despite that they primarily derive from a past tradition, they emerge as an entirely other ontological situation, while, at the same time, no rational law is sufficient to explain that ontological transformation. As neither dependent only from functionality, nor logically implied by functional rules, institutions “have drawn their source from the social imaginary” and are created autonomously in regard to
the circumstances they aimed to symbolize. Hence, except for the part that originates from the formerly existing tradition, the rest institutional content comes from nothing and out of nowhere, like a work of art from its creator that exceeds the current limits of being. And while "it does not have a provenance but is an advent", it cannot be determined by previous ontological figures, nor bear any rational connection with its sources.

Therefore, Castoriadis claims, with which this paper agrees, that institutions are emerging ex nihilo; that, due to its imaginary capacity every society is to some extent 'free' – that is, autonomous – to self-institute itself according to the manner it conceives its World, its needs and its desires. Hence, society, given that is revealed simultaneously as a self-instituted and self-instituting organism, becomes the maker and the subject of social life, never ceasing to alter itself. As such, any society is primarily 'free' to organize itself according to the significations of its social imaginary. That said, institutions are autogenous; their source is society itself, seen as an autonomous organism, principally unaffected by external parameters.

2.3. Institutional constraints

Of course, such autonomy comes along with critical restrictions as to what extent society may function as a self-instituting and self-instituted organism. Despite their ex nihilo origins, institutions emerge not freely, but under constraints, "bound up with nature […] and with history (with what is already there)". Thus, despite the initial freedom for autogenous instituting, constraints still spring mainly from history and nature.

On the one hand, historical constraints constitute the pre-existing tradition, which is partially incorporated by every future institution. That said, "the relation to this past is itself a part of the institution of society", while "the 'reception' of past and tradition […] is, in fact, re-creation". In that sense, any tradition resists against change, while challenged by the future ontological sequences. From this collision historical constraints derive.

On the other hand, natural constraints spring from nature, as an order
of Being separate from human societies (25). As natural laws are morally neutral, everywhere and for everyone the same and, most importantly, not susceptible to manipulation, their restrictions remain binding even while ignored (26). Hence, the instituting source resides “in what is not social or historical – in the pre-social, or the natural” (27), which constitutes a given organization that “puts stops or limits” on the instituting society (28). Consequently, self-instituting society is leaning on the first natural stratum, not only because “a natural fact can provide support or stimulus for a particular institution or signification” (29), but concurrently because its institutional autonomy is constrained.

Under the light of these standpoints, human societies are obliged to take natural phenomena into account “under penalty of death” (30), because they constitute a key factor for the sustenance of social life. What is more, in contrast to historical constraints, natural constraints deliver reference points for social institutions, thus assuming a passage from the natural to the social; for natural reality “not only resists”, but also “lends itself to transformation” (31). Therefore, inasmuch as human perception over natural constraints is trustworthy, the project for leaping from physics to metaphysics arises.

Particularly on environmental ethics, natural constraints associate with the properties of natural resources. While sustainability reflects on the balance between the present usage and the future preservation of natural resources, natural constraints are institutionally projected – or imposed – on economic institutions. Consequently, as industrial production is dependent on resources as its motive force, the related constraints institutionally formulate the limits of energy consumption. As the next stage, we are obliged to seek what is exactly meant under the term ‘nature’.

3. Understanding nature

In the attempt to conceptualize ‘nature’, we confront the challenge to harmonize scientific realism with social imaginary. This stands on the claim that, while as a principle natural laws are trustworthily depicted by science,
they still constitute social creations.

3.1. Scientific realism

This paper affirms that natural constraints are elucidated by natural sciences, thus accepting scientific realism for the following ontological standpoints (32).

a) **The Metaphysical Thesis**: The world has a definite and mind independent natural-kind structure, governed by indissoluble laws. As such, while not affected by human imagination, it provides stable references for our ontological perspective and, albeit having historically been conceived differently by contradictory scientific theories, its natural structure remains unchanged.

b) **The Semantic Thesis**: Scientific theories should be taken at face-value as truth-conditioned descriptions of their domain, including observable and unobservable entities. Thus, they are capable of being true or false; if they are true, it can be claimed that even the unobservable entities they describe populate the Cosmos.

c) **The Epistemic Thesis**: Mature and predictively successful scientific theories are well confirmed and approximately true of the world (33), thus containing a distinct reflection of the cosmic truth. Hence, nature can be elaborated only through scientific methods, which are acknowledged as reliable enough to generate approximately truthful deductions (34).

Therefore, as natural laws are rather accurately conceivable by science, natural constraints can be deduced and taken into account by the instituting society as limits to its autonomy. However, aiming for safer deductions, scientific realists suggest a hierarchy among the existing scientific theories in favor those that are mature and predictively successful. To that end, S. Psillos ascertains that “there has emerged a rather stable and well-supported network of theoretical assertions and posits which is our best account of what the world is like”, whereas even deductions by false theories are “retained in current theories” (35).
Thus, this hierarchical distinction complies with the following requirements (36).

Firstly, maturity is required, meaning that "theories have passed the ‘take-off point’ […] of a specific discipline" and hereinafter constitute "a body of well-entrenched background beliefs about the domain of inquiry which, in effect, delineate the boundaries of that domain, inform theoretical research and constrain the proposal of theories and hypotheses" (37). Therefore, mature theories enjoy genuine empirical success (38); even if surpassed by newer theories, their theoretical constituents become stable invariants through historical trial, thus contributing to future successes and holding "an indispensable role in their generation" (39).

Secondly, the condition of non-adhoc-ness is demanded, in order to exclude the scientific theories which, although empirically successful, still only focus on “simply getting the facts right, or telling a story that fits the facts” (40). Thus, two variations are provided: either the problematic one, when a scientific theory emerged due to an already ascertained, but still inexplicable, phenomenon; or the favorable one, when the predicted phenomenon was still unknown at the time the theory was formed, thus generating “novel predictions which are in principle testable” (41). Alternatively, if an already known fact can found a truth-like theory, the further criterion is whether it was used for a theory that predicts it: if yes, this theory is formed ad hoc; if no, that theory is formed non ad hoc and can be regarded as ‘truth-like’ (42).

Therefore, given this hierarchical categorization, we can distinguish the natural laws that may embody trustworthy aspects of the natural structure, from which institutional constraints can be extracted. Particularly in terms of environmental ethics, successful scientific theories can found the fundamental properties of sustainability.

3.2. Nature between scientific realism and social imaginary

As a principle, social imaginary stands in seeming antithesis with scientific realism. That is because it regards scientific theories as creations by imagination, depicting the natural laws acknowledged by the respective instituting society. In that sense, natural laws emerge ex nihilo, as is the case
for every other social institution\(^{(43)}\).

Nevertheless, among other institutions the origins of natural laws arguably differ. According to H. Poincaré, although scientific theories are conventions introduced by scientists, they are not arbitrary, because they emerge from experimental data\(^{(44)}\). This argument distinguishes simply, but categorically, the institutional uniqueness of natural laws: although humanly conceptions of 'nature', they are articulately grounded on empirical facts that render them less susceptible to 'invented' deductions. Hence, natural laws are not created arbitrarily, but through scientific experience, thus limiting the instituting freedom of society.

Therefore, natural laws are *hierarchically* differentiated from the rest institutions due to their much closer leaning on nature. While social institutions can emerge regardless any physical references, instituting natural laws confronts rather strong demands through strict dependence on experimental data. As such, they originate more from scientific facts and less from imaginary parameters. Thus, the abovementioned maturity herein becomes a milestone: if scientific theories sustain repetitive empirical verification, they reliably conceptualize part of the Cosmos and, thereby, build the utmost possible distance from arbitrary human perception.

Consequently, scientists are mostly limited to making predictions—actually, "guesses"\(^{(45)}\)—, based on experimental findings. Albeit a vast limitation to instituting autonomy, only then natural laws attain *the closest possible approach to natural reality* humans may hope to accomplish. And despite adjusting to newer observations, natural laws remain *the least affected from social imaginary* and the most reliable method for understanding natural reality. Subsequently, how sustainability embodies natural constraints remains to be seen.

4. **Sustainability from the leap of Metaphysics to Bioeconomics**

Hereinafter the project is focused on the transition from natural elements to social institutions. Preliminarily, however, we point out that
extracting institutional references from natural rudiments cannot determine the final instituted forms. That said, natural laws posit only the limitations that society should consider as social invariants; how these would be ultimately taken into account is unknown in advance. Hence, it is never nature, but always society that shapes the actual institutional content, customized to its respective circumstances. And while natural constraints cannot be ignored, socially they can be either affirmed or denied, thus embodying differentiated expressions of the common unsurpassable limitations.

Concerning environmental ethics, although sustainability originates from natural constraints, its properties illustrate only instituting principles, not an instituted reality. Hereby objective is to project the problematic as a social disposition, the specification and fulfillment of which demands a long road. In regards to our historical era, even if we could claim that sustainability should be translated as controlled de-growth by reforming the western economic culture, it would demand vast elaboration to stand strongly as a political project.

4.1. Selecting scientific theories as instituting guidelines

Wandering outside the strictly philosophical field, we are obliged to adopt already developed theories that are asserted as mature and predictively successful by the scientific community. Such are the principle of Energy Conservation and the laws of Thermodynamics.

Firstly, when R. Feynman shared the same concept of hierarchical selection, he pointed to the Conservation principles and, most importantly, to the Conservation of Energy. For ‘cosmic’ balance resides in the fact that “the total amount of energy in the world does not change”, while “energy is conserved no matter how complex the process, even when we do not know the detailed laws”. Hence, relevant scientific theories are obliged to be lineated to some extent with the Energy Conservation principle, thus formulating a balancing invariant.
Secondly, in the context of Bioeconomics by *N. Georgescu-Roegen*, whereas the Energy Conservation principle is acknowledged as the First Law of Thermodynamics, Entropy stands out as its second law. Regarded among the fundamental natural rudiments, Entropy law rises as "the basis of the economy of life at all levels" by dividing energy into available energy, which "can be transformed into work", and unavailable energy, which "cannot be so transformed". Hence, in a closed system "the available energy is continuously transformed into unavailable energy until it disappears completely": inasmuch as "only one particular state of energy can be used by man", the finitude of human nature is highlighted, as it can neither surpass nor reverse the entropic consequences. Therefore, "the entropic feeling regulates the activities directly associated with the maintenance of the physical organism", and, in that sense, becomes "the fundamental aspect of life from amoeba to man".

Upon these reference points we will attempt to found the fundamental properties of sustainability, without which economic and environmental institutions would bear deficiencies.

### 4.2. Fundamental properties of sustainability

From the Energy Conservation principle is deduced a balance of energy and matter that governs our Cosmos: resources consumed must be substituted by another energy source, rendering thus unthinkable that nothing fills the ‘gap’. Moreover, inasmuch as resources are regenerated only in accordance to natural, time-demanding mechanisms, they cannot be reproduced by Man. Hence, human societies, when instituting economic processes, are obliged to focus on presently accessible resources in regards to the future available resources. Based on the Energy Conservation principle, energy consumption should be limited in association with the social need and the natural regeneration rate; only then it is harmonized with the sustenance of consumable resources for further use.

Consequently, sustainability is required to incorporate a correlation between the consumption and the regeneration of energy sources, if they are
to be secured for next generations. Possible ways are two: either by constraining the usage of resources to the balancing point where they reproduce themselves naturally; or by introducing alternative energy sources, through which their respective regeneration rates are offset (e.g. renewable energy) \(^{(58)}\). In any case, this correlation reflects on the balance between human financial progress and preservation of natural environment, a fundamental parameter demanded by the Energy Conservation principle, which sustainability should strive to embody.

Furthermore, under the scope of Entropy law, consumed available energy turns into unavailable, thus becoming socially indifferent. Correspondingly, economic institutions are forced to acknowledge "the qualitative distinction which economists should have made from the outset between the inputs of valuable resources [...] and the final outputs of valueless waste" \(^{(59)}\), without which economy is drawn into illusions contrary to natural reality. What is more, except for the fact that the overall energy capacity in our closed system is non-recyclable \(^{(60)}\), human life on Earth "speed up the march of entropy" to the highest possible scale, thus imposing the necessity for environmental institutions \(^{(61)}\).

Under the light of these standpoints, sustainability addresses innately that economic struggle is parallel to biological struggle, because "natural resources represent the limitative factor as concerns the life span" of human species \(^{(62)}\). Hence, sustainability is instituted on the following dipole: on the one hand stands the finite capacity of accessible resources, constantly deteriorating, along with the harmful consequences of their usage (waste, pollution etc.); on the other hand stands the urge for economic growth, seen as an element of human nature, due to which our species strives for a safer, more comfortable life \(^{(63)}\). The former illustrates the unsurpassable limitations imposed by the Entropy Law and, thus, unveils our primary existential fear: that humanity is not immortal and is heading towards an inevitable end – not only as individuals, but foremost as a whole \(^{(64)}\); that human species follow universe in its ultimate fate towards a thermodynamic death \(^{(65)}\) and, as any other, is
destined to extinction \(^{(66)}\). The latter accelerates energy consumption and forces natural resources to depletion, while aiming at a continuous financial development; that is because “not only growth, but also a zero-growth state, nay, even a declining state which does not converge toward annihilation, cannot exist forever in a finite environment” \(^{(67)}\).

Accordingly, on the interaction of these poles depends whether mankind can sustain itself in the future or not. Indeed, the entropic mechanisms formulate the core of sustainability: while elucidating the contradistinction between an energy-demanding economic process and the limitations by natural resources, they highlight the institutional constraints under the scope of the existential threat \(^{(68)}\). In favor of the longest presence possible of humanity on Earth \(^{(69)}\), sustainable management requires financial progress to become compatible with the gradual consumption of energy sources, even if it may lead to firm restrictions on industrial production or consumerist habits \(^{(70)}\). After all, rather revealing is the fact that “given the entropic nature of the economic process, waste is an output just as unavoidable as the input of natural resources” \(^{(71)}\); inasmuch as the more resources used, the more waste is produced, we can assume that, as human beings, the faster we grow, the faster we fall.

5. Concluding remarks

Ultimately, it has been hereby attempted to track the origins of sustainability through the transition from physics to social institutions. From social imaginary to scientific realism and Bioeconomics, a path is traced that points to a sustainable economic policy. Of course, this discourse, crucial as it is, demands further elucidation, for there is still distance to cover in order to finally project concrete institutional suggestions. Nonetheless, we can arguably claim that any social system that fails to respect sustainability is proven ignorant of its affecting constraints and exposes human species to unbalanced environmental circumstances.

In the end, nowadays environmental issues overall cannot allow an optimistic estimation over the future. Nevertheless, despite the current rates
of consumption, which are surely daunting, it is worthy of addressing that hereinafter sustainability has been a serious problematic not only firmly posited, but also risen into domestic and international political discussion; and whereas it is rather probable that Mankind will be confronting an unprecedented environmental crisis in the next generations, it remains a consolation to confirm that the sparks of environmental crisis in the next generations, it remains a consolation to confirm that the sparks of environmental consciousness are – to some extent – already flaring.

Notes:

(1) This paper is a revised version of the report submitted for my attendance to the Advanced Seminar on Innovative Ethics of the Graduate School of Humanities during the first semester of 2019. Special thanks are devoted to my supervisor professor, Dr. Matsuda Tsuyoshi, for the constant support and guidance and to my seminar team, Narumi Ino, Pascal Emmeneger and Nikolai Konovalenko, for embracing my research proposal as our common lead. The work was supported by A.G Leventis Foundation in Greece by granting the respective scholarship to the herein researcher for the year 2019-2020.

(2) This transition from natural elements to social invariants is also signified under the term leap of metaphysics, according to which the emergence of social institutions relates to natural function.

(3) For the historical sequence of imagination see J. Krummel, Creative Imagination, Sensus Communis, and the Social Imaginary, in The Bloomsbury Research Handbook Of Contemporary Japanese Philosophy, 2017, Bloomsbury, pp. 255-284. The philosophical origins of imagination trace back to Greek antiquity through Aristotle, in De Anima, Book III, chapter 3, for whom “the imagination (phantasia) is passive (pathos) vis-à-vis the faculty of sensation but is nonetheless a requirement for thought” and, in that sense, “reproduces the unified senses as mental images (phantasma), which remain even once the sensory object has departed” (Krummel, p. 256). As for the modern European epistemology, I.
Kant in the *Critique of Pure Reason* acknowledges productive imagination (*productive Einbildungskraft*) as a function of human mind that precedes all experience by synthesizing the sense, thus allowing for the empirical application of the categories of the understanding to the received sense impressions and representing "that which is not itself present" (Krummel, p. 257).


(5) *IIS*, p. 127
(6) *IIS*, p. 128
(7) *IIS*, p. 146
(8) *IIS*, p. 141. After all, social imaginary precedes the formulation of rational laws.
(9) *IIS*, p. 145, 146, 149. Thus, human perception requires social institution.
(10) *IIS*, p. 116, 147
(11) In terms of traditional philosophy, social imaginary leads to the "realm" of metaphysics, as understood in Aristotle’s work, *Metaphysics*, and referring to the field that comes after (anc. Greek: ‘meta’) the study of Physics.
(12) Not by mere chance Aristotle had in *The Nicomachean Ethics*, 1103a, already associated ethics (‘ethike) with habit (’ ethos’), due to which none of the moral virtues arises in us by nature. Afterwards, D. Hume claimed that it is not reason, but "custom or habit" the principle, according to which cause and effect are conjoint in a common logical sequence (*An Enquiry Concerning Human Understanding*, [1748] 2007, edited by Stephen Buckle, Cambridge University Press, p. 43, 69). Moreover, the contemporary Japanese philosopher Miki Kiyoshi argued that institutions, signifying culture as a whole, are forms created by the imagination, but at the same time they constitute our world by possessing “reality” despite being “fictions”, whereas their fictionality is forgotten and they are seen as natural or
necessary, as “second nature” [J. Krummel (no. 3), p. 263].

(13) IIS, p. 332, 339. See also Castoriadis, The Greek Polis and the Creation of Democracy, 1983, in The Castoriadis reader, 1997, translated and edited by David Ames Curtis, Blackwell Publishers Ltd, Oxford, p. 274, where it is stated that “democracy implies that all citizens have the possibility of attaining a correct doxa and that nobody possesses an epistime of things political”.

(14) IIS, p. 127, 132. The conversed deduction, that “symbolism too presupposes an imaginary capacity [...] to see in a thing what it is not”, is simultaneously valid.

(15) IIS, p. 116

(16) IIS, p. 150, where is argued that natural circumstances and functional motives are not enough to determine the instituted content.

(17) For the distinction between radical otherness and plain difference, see IIS, p. 195-6.

(18) IIS, p. 129, 131

(19) IIS, p. 197-9

(20) IIS, p. 195, 199-200. Even if some kind of rational connection does exist, it is neither determinable, nor explicable by any human causal law and, thus, remains meaningless.

(21) IIS, p. 201, where is observed that “each time instituting society erupts within society as instituting, each time society as instituting is self-destructed by society as instituting, that is to say each time another instituted society is self-created”.

(22) IIS, p. 125. See also C. Castoriadis, Radical Imagination and the Social Instituting Imaginary, 1994, p. 333 and Done and To Be Done, 1989, p. 370, both in The Castoriadis reader (no.13). Of course, these restrictions inscribe only the furthest limits of institutional autonomy, inside of which social imaginary develops its function. After all, the ex nihilo concept complies with constraints, as long as nothing can happen “just anywhere, just any time and just anyhow” (C. Castoriadis, Done and To Be Done, p. 370).

(23) For the overall constraints see Castoriadis, Radical Imagination (n. 22), p. 333-336.

(24) C. Castoriadis, Radical Imagination (n. 22), p. 333.
(26) IIS, p. 234, 353-4. See also below the metaphysical thesis of scientific realism.
(27) IIS, p. 204
(28) IIS, p. 121, 229, 233
(29) IIS, p. 230
(30) IIS, p. 202
(31) IIS, p. 354
(33) See S. Psillos, (no. 32), p. 103, defining that “a theory is approximately true if it
describes a world which is similar to the actual world in its most central or relevant
features”; thus, “past successful theories, although strictly speaking false, have been
approximately true”.
(34) S. Psillos, (no. 32), p. xx. See also Gironi/Psillos (no. 52), p. 380.
(35) S. Psillos, (no. 32), p. 104. The famous physicist, R. Feynman, in The Character
of Physical Law, 1967, The MIT Press, Massachusetts, p. 59, also argues that
“across the variety of the detailed laws there sweep great general principles which all the
laws seem to follow”.
(36) S. Psillos, (no. 32), pp. 105-113. For an alternative approach to the topic, see
also B. Ellis, Scientific Essentialism, 2001, Cambridge University Press,
Cambridge, who claims that natural properties are themselves the truth
makers of their ontology (p. 217).
(37) S. Psillos, (no. 32), p. 107
(38) S. Psillos, (no. 32), p. 105. Aspects of empirical success are the well-
established nature on the respective field, the unceasing survival without
experimental or empirical rejection etc.
(39) S. Psillos, (no. 32), p. 110-12.
(40) S. Psillos, (no. 32), p. 105.
(41) S. Psillos, (no. 32), p. 105
(42) S. Psillos, (no. 32), p. 106-7, where “there is always the possibility that a known fact
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can be ‘forced’ into a theory, whereas a theory cannot be forced to yield a hitherto unknown fact”.

(43) S. Psillos, (no. 32), p. 110, according to whom scientific theories, like social institutions, are bound with a historical continuity, as past theories "fuel" the future successful ones.

(44) H. Poincaré, Science and Hypothesis, 1905, The Walter Scott Publishing CO., New York, p. 152-4, where is stated that generally true postulates are reduced to “a simple convention that we have a right to make, because we are certain beforehand that no experiment can contradict it”, albeit not arbitrary, but founded on irreversible experiments. After all, “conventional and general principles are the natural and direct generalisations of experimental and particular principles”. See also S. Psillos, Conventions and Relations in Poincare’s Philosophy of Science, in Methode-Analytic Perspectives, 2014, Issue 4, p. 116.

(45) R. Feynman (no. 35), p. 156

(46) See IIS, p. 354, where is stated that “the very thing which is leaned on is altered by society by the very fact of this leaning on – which has strictly no equivalent in the physical world”. This thought implies a middle stage between natural and social, where natural is conditionally adjusted to obtain social aspects and social ceases to remain autonomous towards natural. Thus, leap of metaphysics is not a simple analogy, but an analogy mutandis mutandis.

(47) After all, Castoriadis (IIS, p. 354) concludes that “‘natural reality’ is not only what resists and cannot be manipulated; it is just as much what lends itself to transformation, what allows itself to be altered ‘conditionally’ depending at once on its ‘open interstices’ and on its ‘regularity’”. Therefore, natural constraints are combined harmoniously with the concept of self-instituting and self-instituted society, while concurrently guarantying social otherness.

(48) R. Feynman (no. 35), p. 71-3

(49) R. Feynman (no. 35), p. 71


(51) N. Georgescu-Roegen, The Entropy Law and the Economic Process (no. 50), p. 4

(52) N. Georgescu-Roegen, Energy and Economic Myths (no. 50), p. 351.

Anthropomorphically, "energy is available or unavailable according to whether or not we, humans, can use it for our own purposes" [N. Georgescu-Roegen, The Entropy Law and the Economic Process in Retrospect (no. 76)].

(53) N. Georgescu-Roegen, Energy and Economic Myths (no. 50), p. 352


(57) See N. Georgescu-Roegen, Energy and Economic Myths (no. 50), p. 374, where the same claim is affirmed under the condition that “the demand of the present generation reflects also the interest to protect the children and perhaps the grandchildren”.

(58) Of course, apart from positing the problematic, this approach is hardly implementable, because the regeneration for some of our current energy sources (e.g. oil, coal) demands hundreds, even millions of years, rendering their offset still beyond human measures.

(59) N. Georgescu-Roegen, Energy and Economic Myths (no. 50), p. 353


(61) N. Georgescu-Roegen, Energy and Economic Myths (no. 50), p. 353


(63) N. Georgescu-Roegen, Energy and Economic Myths (no. 50), p. 363-5, according to whom growthmania has become a constant for economic systems and plans.

(64) "Hardly anyone would nowadays openly profess a belief in the immortality of mankind."
Yet many of us prefer not to exclude this possibility; to this end, we endeavor to impugn any factor that could limit mankind’s life. The most natural rallying idea is that mankind’s entropic dowry is virtually inexhaustible, primarily because of man’s inherent power to defeat the Entropy Law in some way or another” [N. Georgescu-Roegen, Energy and Economic Myths (no. 50), p. 359]. Concerning Buddhist religious studies, see Sueki Fumihiko, *Religion and Ethics at Odds*, 2016 [2013], trans. by A. L. Sevilla, Chisokudo Publications, Nagoya, p. 150, where it is stated that “thinking of death of humankind is, far more than thinking of the death of an individual, terrifying to the point of absurdity. If the individual dies, then perhaps what one leaves behind can be taken up by one’s children. But if humankind as a whole perishes, then in such a future, there is no comfort to seek”.

(65) N. Georgescu-Roegen, Energy and Economic Myths (no. 50), p. 352, where is asserted that “according to all the evidence, our immediate environment, the solar system, tends toward a thermodynamic death, at least as far as life-bearing structures are concerned”.

(66) N. Georgescu-Roegen [Energy and Economic Myths (no. 50), p. 349] refers to extinction as “the most certain fate of mankind”, which “we do not know when and why it will come”.

(67) N. Georgescu-Roegen, Energy and Economic Myths (no. 50), p. 367. See also p. 376, arguing that, “if we stop economic growth everywhere, we freeze the present status and thus eliminate the chance of the poor nations to improve their lot”.

(68) N. Georgescu-Roegen [Energy and Economic Myths (no. 50), p. 367, n. 49] comments that, “if the present inflow from nature is incommensurate with the safety of our species, it is only because the population is too large and part of it enjoys excessive comfort”.

(69) Rather troublesome is the thought that “any use of the natural resources for the satisfaction of nonvital needs means a smaller quantity of life in the future” [N. Georgescu-Roegen, The Entropy Law and the Economic Process (no. 50), p. 21].

(70) Of course, this case is grounded on the condition that human population will stop accelerating. See also N. Georgescu-Roegen, Energy and Economic
(71) N. Georgescu-Roegen [Energy and Economic Myths (no. 50), p. 357.] claims that "Bigger and better" motorcycles, automobiles, jet planes, refrigerators, etc., necessarily cause not only “bigger and better” depletion of natural resources but also "bigger and better" pollution.

References:
consciousness are – to some extent – already flaring.