

From Efficient Causality to Generativity

Introduction

In this Cartel we propose a possible rereading of some papers, the majority of which presented at the Biennial Emery Conferences (from 2014 to 2018), in order to draw an *Over-Conclusion*, suggested by the Fundamental Formulation of the Maximum Ordinality Principle.

Such an Over-Conclusion will be based on two Fundamental Aspects:

- a) The Maximum Ordinality Principle proposes a *radical passage* from a description of the surrounding World traditionally based on the concept of “*efficient causality*”, to a radically new description based on the concept of “*Generativity*” (or, rather, “Emerging Generativity”)
- b) Consequently, a correlative question arises: “What is the “*origin*” of such a Generativity”?

As a *logical premise* of the Aspect a), it is worth recalling that Modern Science is characterized by a persistent and progressively ascendancy toward ever more general Physical Laws and Principles.

However, before any formulation of a single hypothesis or a physical theory, Modern Science (let us say, from Newton on) adopts three fundamental *pre-suppositions* assumed “*a priori*”: the *causality principle* (also termed as “efficient causality”), *classical logic* (also termed as “necessary logic”), and *functional relationships* (between the various parts of any System analyzed).

On the basis of such fundamental “aprioristic” presuppositions, and only after having developed a strictly conform consequential *formal language* (that is the Traditional Differential Calculus (TDC)), Modern Science progressively ascends toward ever more general Physical Laws and Principles:

i) from Phenomenological Laws (e.g. Kepler’s Laws); ii) to Physical Laws specific of each Discipline (e.g. Newton’s Laws, Maxwell’s Equations, etc.); iii) up to the three well-known Thermodynamic Principles.

Such a progressive development has given origin to a hierarchy of a *multiplicity* of *quantitative* Physical Laws and Principles, in particular as a consequence of the first basic presupposition: the *causality principle*.

This Principle, in fact, has led Modern Science to introduce “*different causes*” in *different Disciplines*.

The *Principle of causality*, in fact, tends to “sub-divide” the entire phenomenology (at present known) in different “branches”, precisely because, on the basis of such a presupposition, it leads Scientists to research for the most “appropriate causes” pertaining each specific set of phenomena each time considered.

In this way, Modern Science persistently propends to show that: “*Every System is a mechanism*”.

Such a conclusion, however, although confirmed by experimental results, can be considered as being valid *only* from an *operative* point of view, but not from an *absolute point of view*. This is because “necessary logic” (adopted as second basic presupposition) does not admit any form of “*perfect induction*” (see Popper’s *Falsification Principle*).

In fact, in the strict contest of “necessary logic”:

- i) after having formulated a single or more hypotheses (such as in the case of a Theory);
- ii) after having formalized them in an appropriate formal language (faithfully conform to the three above-mentioned basic presuppositions);
- iii) after having drawn the consequential conclusions
- iv) and after having also obtained experimental confirmations of the previous formal conclusions;
- v) *it is impossible, in any case whatsoever*, to assert the *uniqueness* of the *inverse* process. That is: it is impossible to show that the hypotheses adopted are the *sole* and *unique* hypotheses capable to explain those experimental results. This is precisely because of the *absence*, in “necessary” logic, of any form of *perfect induction*.

In fact, only in the presence of a *perfect induction* it would be possible to assure the *uniqueness* of the *inverse* process and, thus, to transform the adopted hypotheses into an *absolute* perspective.

This means that Modern Science, precisely because based on *necessary logic*, should always be “open” to recognize that *there always exist* many other *possible* Approaches (in principle *infinite*) capable to interpret the same experimental results.

At this stage, the Reader is invite to read the papers presented here below:

Paper 1, titled “**Toward One Sole Reference Principle Generating “Emerging Solutions” of progressively ascending Ordinality**” (Gainesville 2014), which illustrates a process that, as explicitly indicated by the title, tends “Toward *One Sole Reference Principle*”, which, as shown in the text, is based on the concept of *Generativity*;

Paper 2, titled “**The “Emerging Quality” of Self-Organizing Systems, when modeled according to the Maximum Ordinality Principle**”, offers a **Radically New Perspective to Modern Science**” (Gainesville 2016), which presents, in more details, the Perspective previously delineated by Paper 1.

Paper 3, titled “**Self-Organizing Systems, when modeled according to the Maximum Ordinality Principle, always present explicit formal solutions, in their Proper Time and Proper Space**” (Gainesville 2018). This Paper, apart from the explicit solution, shows that *non-living System*, *living-System*, *thinking-Systems*, are characterized by *specific Generativities* that are *differentiated* between them. This is also due to the fact that such differentiated Generativities refer to Systems characterized by their specific *Proper Time* and *Proper Space*;

Paper 4, titled “**The Evolution of the Universe as a Self-Organizing System in the light of the Maximum Ordinality Principle, in the absence of “dark energy” and “dark matter”**” (Gainesville 2020), which shows that the concept of “*Generativity*” is not only valid with reference to “finite” Systems, but also for the Universe as a Whole.

Such an Aspect is illustrated in more details in the successive Paper. In fact:

Paper 5, titled “**The Accelerated Expansion of the Universe in the light of the Maximum Ordinality Principle**” (2022), illustrates how The Accelerated Expansion of the Universe is the *exclusive exit* of a *Generative Process*, without any specific reference to “Dark Energy” and “Dark Matter”.

At this stage:

- Given that all the Processes and Systems of the surrounding World can be described by a *unique and sole Principle*, the Maximum Ordinality Principle
- on the basis of which all of them can be described in terms of *Generativity*, instead of “efficient causalities”
- where the *Generativities* of *non-living System*, *living-System*, *thinking-Systems*, are *differentiated* between them, in particular because, among other aspects, they refer to Systems characterized by their specific *Proper Time* and *Proper Space*

The Question that arises is: is that a “*simple fact*”, *to be accepted like that*, or can it suggest a possible reference to a *more General Concept of Generativity*?

Such a question is destined to remain substantially “open”, in particular for “The Absence of Perfect Induction”, both in the Traditional Approach and the Ordinal Approach.

Nonetheless, it is possible to recognize that the New Scientific Perspective, precisely because of the “absence of perfect induction”, but always orientated at the “Emerging Quality”, is able to “open” additional New Perspectives in other fields of knowledge, even *completely different* from those of Traditional Science.

A Possible “Rebound”

In fact, with specific reference to the Ordinal Approach, the concept of “Quality” is never achieved in its “fullness”. In fact, it is only represented in terms of Ordinality, where the latter is understood as a “cipher” of Quality. Consequently, Quality is always recognized as being “not less than” the specific level of Ordinality each time achieved.

In such a phenomenological perspective and, in particular, in the previous considered case of the Universe as a Whole (as considered above), the concept of Ordinality, understood as a “cipher”, suggests that there will always be some “Emerging Exits”. In such a case, in fact, “Emerging Exits” cannot properly suggest a description characterized by a higher level of Ordinality, because the latter is precisely evaluated on the basis of a finite (although extremely high) number of physical entities.

Consequently, the “Emerging Exits” might more properly suggest the adoption of a *different* (and *more general*) concept of “*Generativity*”, with respect to those pertaining to the various Processes each time considered.

In other words, a concept of “*Generativity*” of *Different Nature*, which is not adequately representable by the Incipient Derivative which appears in the mathematical formulation of the M.O.P., although it can result as being differentiated in different and proper terms in the case of *non-living Systems*, *Living Systems* and “*Conscious*” *Systems*.

Possible Perspectives of Research for a “Generativity” of Different Nature

This particular aspect is analyzed in detail in Paper 6 - “**The Absence of Perfect Induction in Science**” (2020), in which, after having recalled the Basic Characteristics of the Two Fundamental Scientific Approaches at present known, the Paper presents its conclusions about a possible Research for a *New Scientific Approach* characterized by a *different* and *more general* concept of “*Generativity*”.

However, for the sake of continuity with the presentations of the previous Papers and for the sake of clarity, such Conclusions will be here anticipated.

During the research for a *more general* concept of “*Generativity*”, it is always possible to continue to adopt (for example) the Approach based on the “Emerging Quality” of Self-Organizing Systems. This is because of its wider experimental validity and, contemporaneously, to research for a new and more adequate Concept of “*Generativity*”, on the basis of *other Disciplines and Perspectives*, even completely different, although always characterized by the “absence of perfect induction”.

In such a research, in fact, the *phenomenological Generativity* that appears in the M.O.P. can be seen as the “*Reflex*” (always at a phenomenological level) of something “Extra”, which, in its “essence”, cannot be “reduced” to a simple description in terms of the sole phenomenological nature, as it appears in the M.O.P.

Even in this case, however, the correlative description does not achieve the “perfect induction”. The sole difference consists in the proposal of an “Extra Hypothesis” with respect to those pertaining to the known Ordinal Scientific Approaches.

Such an “Extra Hypothesis”, however, could be able to suggest a form of *Over-Ordinality* and, correlatively, an “associated” *Higher Level of Quality*, which, nonetheless, will always be recognized as being “not less than”.

Among other possibilities, it is worth mentioning a possible Perspective based on “*Faith*”.

In this context, in fact, the *phenomenological Generativity* that appears in the M.O.P. can be seen as the “*Reflex*” (always at a phenomenological level) of a “*Gift*” of God, as Creator of the Universe. A “*Gift*” which, in its “*essence*”, cannot clearly be “*reduced*” to a simple description in terms of the sole phenomenological nature, as it appears in the M.O.P.

Even in this case, however, the consequential description does not achieve the “*perfect induction*”.

The sole difference consists in the proposal (among several other possibilities) of an “*Extra*”, which is “*Compossible*”, and *thus not in contrast* with respect to the known Scientific Approaches.

An “*Extra*” that could represent a form of *Over-Ordinality* and, correlatively, a “*reflexed*” form of a *higher level of Quality*, which, nonetheless, will always be recognized as being “*not less than*”.