An Introduction to Eurhythmic Philosophy

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Abstract. Eurhythmic Philosophy, also called the Philosophy of Rhythms, aims to extend the concepts of harmony, complexity, cooperative interaction, emergence and non-linearity to several areas of human knowledge. This text is intended to invite readers into participating in what is hoped to become a new philosophical paradigm, i.e. a new intellectual soil fertile in methods and ideas, and believed to be specifically suited to deal with the challenges and problems of the 21st century.

Keywords: eurhythmy, harmony, complexity, cooperative interaction, emergence, non-linearity

1. Quantum Physics and the Rise of Eurhythmic Philosophy

All beings act in the world in order to prevail. In a certain sense, how could one be more eloquent, describing the inner self of things and their reason to be? From a pure material way of being, if it is of atoms, rocks or planets that we speak, to an organic way of being, now talking of the living. But it is precisely this dichotomy, arising from the division between life and the inanimate, that, in fact, becomes improper as part of a eurhythmic narrative of the Universe.

The opening statement in this introduction formulates the principle of eurhythmy, the cornerstone of a new natural philosophy introduced by J. R. Croca, R. Moreira, and other thinkers of the so-called Lisbon School of Eurhythmic Physics (Mazzola, 2015, 401; Castro, 2017, 50; Croca; 2015, 11). It is an ontological assertion that invokes for all the natural things properties that normally are exclu-

sively attributable to human agencies. Those agencies that always want to marginally stand against the remaining Nature. Intelligence, purpose, teleology or intentionality are aspects of a type of action reserved to man or, at best, to living systems of deserving complexity. But what if we hypothesize that all systems in the Universe should have an internal complex structure? Like a Russian dolls structure, containing and being contained, one after the other, along with a sequence of scales, progressively and unimaginably smaller or, inversely, larger to whatever ultimate reality may be? From the very small edge of potential nothingness, understood as the *Apeiron* of Anaximander or the subquantum medium, until the very large far distant perception, merging with what we loosely call infinity? Then, atomistic materialism ceases to make sense, since every structure is a living and intelligent recurrence of the same tendency, that of appearing in the world solely to fulfil the tendency to remain there, making its own structural maintenance, without recourse to external agencies (physical or metaphysical) and being a harmonic "living" structure of its own, striving at each scale.

The existence of volition, the potentiality of individual liberty and the existential responsibility of all beings is reaffirmed. However, in order to exist, there is the need for cooperation with the surrounding environment, implying a harmonious relationship with the otherness. A natural, embedded willingness to coexist, not to subjugate the other, not to conquer in the world, rather a willingness to cooperate.

Eurhythmy, which in the Greek etymological origin means the best path, rhythm or cadence, then becomes synonymous with structural stability, either at each individual level or at the overall level of the global system provided by the alliances between its parts. A stability that is in each individual best interest and also in the best interest of the whole. A protective whole, that will also have to gain from the assembling powers of its parts. In this sense, a cell exists only because its parts are there, interacting in order for the cell to exist, while, in fact, being protected by the cell's interior arena of

existence.

In such a context, rhythm is thus understood as the repetition of what is best for the totality of beings, thus the repetition of any atomic, physical, biological, social or cultural pattern making maximally stable the existence of each being along with others. It is, therefore, eurhythmic to set the proper patterning matching between entities in interaction, creating the best-fitted behaviours in order that each system prevails. All this, interacting at a certain scale, give rise to ever more complex structures at ever at higher scales.

The stability of the possible interactions between things, as a consequence of a teleological synchronization between behaviours, leads to the hypothesis that it is possible to make an undulatory description of any phenomenon in the world as, in fact, quantum mechanics already did while addressing the atomic phenomena. This description must, however, be adapted to each system, its scale and the context in which it is located, listing its regular behaviours and marking the topology of its repetitions in the most fitted space of representation. Not then and necessarily, the space-time stage where the physical discourse is usually written. From this topological representation, it will hopefully result in a wave representation that will encode the totality of its system possible behaviours. This wave representation corresponds, therefore, to a memory, in some cases, physical, and in other, merely abstract, of a nomological character. That is, it will encode what are the regular behaviours of the object, thus defining the object itself. A system will, therefore, be equivalent to the set of all its possible behaviours, be it an electron, a person or a nation. This is the general meaning, adopted in this text of what will be called a *theta wave*, a concept originally applied by the Lisbon School of Eurhythmic Physics to atomic entities (Croca, 2015, 39) in order to explain their undulatory behaviours. In a more general formulation, a quantum theta wave is a real disturbance, in opposition to the probability standard psi wave (this without material substance) that propagates in the subquantum medium. The quantum theta wave is generated by an *acron* (or corpuscle), be it an

electron, proton, photon, molecule, planet or galaxy that organizes its surrounding environment. A wave that once generated, interacts back with the generating system, attracting it to the regions where the undulation has greater intensity. A guiding effect that, of course, implies a rhythmical encoding of all possible movements of the physical corpuscle in the resulting spatial and temporal topology of the wave. The theta wave thus stands as an ontological memory of the *acron* (Fort, 2010, 17515).

This foraging behaviour of the corpuscle inside its wave, as it looks for the most suited places in it, fulfils a principle of energy saving since, in the places where the undulatory disturbance is weak, the *acron* will try to restore it at the expense of its own energy.

In this new model, unlike orthodox quantum mechanics, the wave entity has a finite extension, spreading along a limited spatial region, to ultimately fall in the subquantum undefined void, far from the *acron*. Consequently, and in fact following the ideas of the French physicist Louis de Broglie (de Broglie, 1927, 225; de Broglie, 1960), from where these ideas originate, subquantum wave and corpuscle do exist simultaneously in the same objective reality. There will be therefore no need for conscience collapsing mechanisms acting upon probability psi metaphysical illusive waves. A very significant formal improvement, allowing for the quantum wave's realism, was introduced by the Lisbon School of Eurhythmic Physics, surpassing the need for infinitely spread waves throughout the entire Universe. A condition that Niels Bohr thought as indispensable for the localizable wave packaging of an electron or any other atomic particle. In fact, Croca (2015, 39) managed to introduce the Morlet wavelet (Grossmann, 1980, 723) representation - a Gaussian sine modulated curve having a well-defined wavelength and frequency at all times - in the quantum realm. This has furthermore resulted in a more general set of uncertainty relations, from which Heisenberg's are just a particular and extreme case (Castro, 2017, 6). A case thus obtained when the Morlet wavelet approaches a pure harmonic plane wave. This means of course that the new model is broader than orthodox

standard quantum mechanics and can even be extended to upper scales. Recognizing the possibility of a unifying ontology, strained in the theta wave – *acron* picture, the atomic reality becomes a part of one and the very same reality, having undulatory properties at all scales. In fact, a comprehensive pilot-wave gravity model for the Solar system has been proposed concerning the Titius–Bode regularity (Croca, 2017, 76). *Physis*, the Greek original word for Nature, becomes finally one, without any artificial cuts, based on its logical functioning and without rational agents who, with incomprehensible and megalomaniacal solipsism, create reality through observation. Finally, we seem to be in such conditions as to surpass the Copenhagen School and the psychologist interpretations of Niels Bohr about reality.

2. Extending Eurhythmic Philosophy: Cooperative Behaviours and Emergent Regularities in Nature

Although following to the universal *Principle of Eurhythmy*, it is nevertheless expected that the mechanisms and strategies serving such a purpose of affirmation - that of one's own perpetuation - will vary at different scales and for different degrees of complexity. Let us compare an electron to a human. The behavioural memory of an electron, encoding all its possible behaviours, is thought to be its theta wave, vibrating in a more or less stable manner on the sea of subquantum oscillations. The analogous memory structure for the human being will, rather reasonably, be encoded in the brain, which indeed should play an important part in the undulatory description of human patterns and habits.

Since there is now a behavioural memory that can be associated with things and their history, as eurhythmic behaviours will have been the most repeated, there is also the possibility that what we call laws of Nature are, in fact, just empirical rules resulting from a judicious repetition of those behaviours that best conform to the stability of things. An object will, therefore, simultaneously store the

overall history of the type of systems to which it pertains, along with its own history. Something that sounds quite akin to biological genetic encoding along an evolutionary process. Thus, an object of a physical form will, in fact, encode what the object is and can do, without the need for any external impositions from a physical or metaphysical origin. Consequently, everything in Nature permanently evolves, inscribing things in the world by the force of its own activity, a strive from within, innate, like Spinoza *Conatus*, starting from itself, no longer in an agonistic and competitive way, but seeking to a concert with the surrounding environment. It is a form of action that allows for intelligent structures to teleologically subsist, turning violence and aggressive behaviours only in a particular preservation mechanism among many others and making the concentration and harmony alliances the rule of thumb in reality. Showing that competitive agonistic strategies are not the fundamental ones in Nature, as a certain economic Neo-Darwinism would have it. How else, in fact, would it be possible to logically reconcile the overall resulting harmony, ubiquitously present in Nature, with the violent seemingly only local dialogues, highly balanced on a global ecological level, between, let's say, predators and prey?

Each structure in the Universe can then be considered a *noema*; the Greek word to be used here for *materially substantiated thought*, leaving behind the ontological distinction between Nature's spoken language and Nature itself, as the universal speaker.

But, clearly, if there is now an authorship coming from *Physis* itself, since there is an overall agreement between beings, there is also a eurhythmic dialogue occurring between them. This dialogue and therefore the relations that things agree to have between themselves are to be of a non-linear character. This means that when several entities meet, they interact in a way that from such a reunion that modify in them all results, as the structural encoded memory approach would suggest. Consequently, each interaction brings with it new behavioural possibilities, immediately given by the presence of the otherness. And, in this sense, the coalition between alterities

brings always a phenomenological enrichment, producing new regularities. The resulting whole, therefore, will also be the logical result of this enrichment, from which its properties will not be causally reducible to the properties of the parts, individually considered. Things in the world appear in a non-amorphously way, without avenging brute force, rather compelling to the intelligent exercise of subtle information, establishing pathways between them. Routes of material signification in which a minute amount of energy can produce dizzying effects on all systems, either between pairs at the same scale or between structures acting on different scales all together. In face of such interactive non-linearity, Cartesian atomism becomes insufficient to write this new Science. And nor will the opposite view of methodological holism will serve, since the whole, though distinct from its parts, maintains a dialogue with each of them. An up and down communication, vertically hanging on the axis of scales, without there being a hierarchy of meaningful phenomenological importance. Indeed, this relation between the whole and the parts, considered as such a whole, somehow, distinct from its own component entities, will perhaps point to a richer mathematical logic framework, defining what we would call a second order non-linearity, as compared to the one already mentioned between entities interacting at the same scale.

There will no longer be vertical down or up causation, only a systemic dependence between scales, both ways. It is, therefore, necessary for an *Organicist Science* to be drawn, capable of going beyond the mere mechanical explanations as to how regularities become visible in the world. A scientific and philosophical discourse unified by a single language in which no system, kept "alive" among its own individual history, remains equal to any other. A narrative about a Universe where there is a true hetero-atomism and individuality, distinguishing two photons, two electrons or two atoms of the same element, two molecules, plants and animals. Where, at the very most, there are averages of behaviours and where the physical constants of the usual mathematical discourse are merely local and

context dependent on the particular environment in which each phenomenon proceeds. Where, in addition, behaviour alterations can occur suddenly without there being any sort of immobilism. A new discourse to be claimed a new Natural Philosophy about a Universe attentive to the history of its structural emergent events, and also downfalls. Attentive to ontological victories and defeats upon chaos and indefiniteness. Nothing is raw matter, everything is life. From the lower scales, on the voiding edge of the subquantum medium, to the great clusters of planetary matter, these far scale realms standing both at the extremes of the phenomena plateau we are used to in biology. And yet this means that some other more sophisticated and embracing definition of Life should be searched for.

All bodies then exhibit self-induced movements, without external force fields acting upon them, as requested by Newton, in the 17th century. Without restrictions imposed on systems by global, physical, or metaphysical agents, those that even today rest epistemologically without explanation or foundation in the very axiomatic pillars of modern science. It is rather from the joint activity of all the natural systems that, in fact, arises the whole phenomenological description, seeking to recognize forces or field structures in space.

Eurhythmic Philosophy implies, therefore, a new vision of Nature, which is on *Physis*, upon its diverse, although undivided, totality. A view that cannot be mesmerized by mathematical tricks, such as those derived from the metaphysical standpoint of the Copenhagen School or from the numerical infinities, brought about by General Relativity equations, claiming the existence of space-time singularities or infinitely dense points at the beginning of creation. Reality is only and firstly real, besides the illusive results of our often-misguided formal interpretations. Mathematical equations do not equate Reality, rather they always and only provide a pale introductory image of it. And the twenty century informed citizens in our advanced western democracies should keep a rather critical standpoint about even the common-sense reasonability of what orthodox quantum mechanics, black hole and big bang proponents speaks

about. Most of the time, only based upon wild mathematical conjectures, hammered to fit the observable evidence in the context of this or that interpretation of reality. We should watch entrainment television shows about science with the same freedom of thought as we would ideally have towards any other subject. No theory should be thought as the last theory. This also applies to what is being proposed here. From now on it is necessary to require descriptive finitude in the mathematical language of reality. It will be necessary to resist Platonic vertigo.

3. Conclusion and Challenges for Eurhythmic Philosophy in the 21st Century

Eurhythmic Philosophy considers Nature to be an organic whole formed by complex structures of different degrees of organization. They interact intelligently according to a teleology of permanence, accordingly to the rhythms most suitable for the universal maintenance of all structures involved. The most perennial and stable structures are those resulting from a harmonious cooperation between the parts. All interactions proceed in the context of such cooperation and there are no possible interactions in which the actors do not endure some kind of adaptation before the others. Systems encode their possible behaviours in their own structures and there are no external physical or metaphysical determinations imposed upon the behaviour of things. These are animated by their own movement which is fully self-induced. Such a philosophical speech, as many others, also entails a pretext for reaffirming a better world. It is also an ideology, a well-intentioned narrative about noble values to attain. It is precisely the proposal of yet another idealistic and utopian vision. A utopia that foresees energy and economic resources to be distributed in a fair eurhythmic way. A utopia that predicts the end of famines, poverty and social injustice. Which considers Nature as the model to follow, where there is no accumulation of capital, nor financial speculation under any possible

physical or biological interpretation. Where it is not the primacy of the strongest that promotes survival, but rather the primacy of the most cooperative beings that bring stability and progress to the whole. The primacy of a being always whiling to accept and accommodate the otherness in its surrounding environment.

It is, therefore, an epistemological revolution in the sphere of human behaviour that is here asked and expected. This is the fundamental and greatest challenge that Eurhythmic Philosophy faces. The acceptance of the idea that just as there is no cruel, mechanical, cold and agonistic Nature, there must also not be a world of human relations in which selfishness stands as the prevailing value. The acceptance of the idea that the world, as an inevitably unbearable place, is to be considered merely an illusion, resulting from a misleading, mechanical and sombrely competitive interpretation about how natural systems in fact behave. Nature is, after all, intelligent and subtle, promoting cooperation, construction, stability and harmony.

There is, therefore, an opportunity for formulating Eurhythmic Politics, a Eurhythmic Economy, theories that replace the concept of competition with the much wider concept of cooperation, as it should be in all areas of human knowledge. Henceforth, man will no longer be in the world to dominate but to determine the means by which he obtains the world's assistance to his own enduring adventure. There is a new ethic awaiting to be written, initiated by environmental concerns, but without being terrified by the scarcity of resources, as the advancement of Eurhythmic Technologies may, in fact, bring new possibilities. Perhaps Eurhythmic Physics points to a new thermodynamics, in which information and non-linearity are the fundamental concepts of the entropic game, rather than energy dissipation, characteristic of uncooperative closed systems. Perhaps we will see the full and unanimous theorizing of self-sustaining systems, extracting energy from the subquantum medium in overwhelming amounts. Perhaps one will then see the constitution of a technology capable of manipulating theta waves in Nano-struc-

tures, provoking a true revolution in the area of imaging and medical therapeutics. Perhaps even we will witness the manipulation of gravitational theta waves, producing fields of force and vehicles whose locomotion does not depend on the Newtonian action-reaction dipole, to be considered a mere case of a more general undulatory theory describing interactions (Croca, 2017, 145).

Science fiction, some would say, fantasies, pseudoscience, unworthy of academic gaze, would respond the most severe. Usual accusations before the fulfilment of utopian dreams. We'll see.

But there are other intellectual challenges that Eurhythmic Philosophy must also address in order to prevail. There is the need for a general method to study the generality of physical situations, looking for undulatory constrains between systems. Specifically, a consistent way of formulating the so called eurhythmic conditions under which the interacting entities combine and eventually form a composite system. This methodology may eventually be related to a mathematical formulation involving extreme value derivation, showing constrains of a teleological nature, such as may be associated to the Principle of Maupertuis or to the Principle of Fermat. The relation with the Hamiltonian and Lagrangean formulation being possibly obtainable. In any case, it is necessary to quantitatively represent what could be called the degree of Eurhythmy and proceed to its maximization through appropriate calculation in several contexts and areas of knowledge. It is clearly an open problem. It is also necessary to construct a formal mathematical language with enough sophistication to deal with the interdependence conditions between a system and its components, along with both ways of the causal vertical axis. A formalism capable of expressing the emergence of new properties in the overall resultant structure, that are irreducible to the properties of the parts.

It is necessary to formulate a general methodology for applying Eurhythmic Philosophy to other fields of science besides physics. Namely, to chemistry and biology, the social and human sciences and to the so-called complexity sciences. It is necessary to formulate

and solve concrete problems in each one of these areas, trying to build the required paradigm. It is necessary to instruct Eurhythmic Philosophy with the rich empirical legacy already produced by the complexity sciences, including the concepts of self-organization, positive and negative feedback, self-criticism, non-dissipative mechanisms, and long-range correlations. Generalizing and adapting, in turn, the concepts of frequency, phase and coherence of the wave jargon to new realities outside the physical realm. It is necessary to develop a general theory of emergence, a technical philosophical discourse capable of dealing with the evolution of regularities in the Universe and with the possible locality and transience of the so-called laws of Nature, able to explain behaviour encoding in the structures of all systems. Able to deal with the concept of nomothetic variability and to describe and explain the mechanisms through which repetition of interactions may result in stable patterns and behaviours.

These and other challenges herald the fecundity of an ontology that severely questions the atomistic and monolithic Cartesianism. That criticizes the mechanistic coldness of the brute dialogue between action and reaction in which the old science has become enslaved. Let this text thus be understood as an invitation to reflect on and to contribute to the development of what is thought to be a new promising area waiting to be explored.

References

Castro, P., Croca, J. R., Gatta, M. & Moreira, R. "Generalized Uncertainty Relations in Quantum Mechanics and the Principles of Completeness in Physics." *Physical Science International Journal*, Vol. 16, Issue 4 (2017): 1-9.

Castro, P., Croca, J.R., Moreira, R., Gatta, M. "On the Foundations of Eurhythmic Physics: A Brief Non-Technical Survey." *International Journal of Philosophy*, Vol. 5, No. 6 (2017): 50-53.

Croca, J. R. *Eurhythmic Physics or Hyperphysics*. Saarbrücken: LAP Lambert Academic Publishing, 2015.

Croca, J. R., Castro, P., Gatta, M., Cardoso, A., Moreira, R. "Pilot-Wave Gravity and the Titius-Bode Law." *New Horizons in Mathematical Physics*, Issue 3

(2017): 75-81.

Croca, J. R., Castro, P., Gatta, M., Gurriana, L. "A Possible Explanation for the EM Drive Based on a Pilot Wave Theory." *Journal of Applied Physical Science International*, 8 (4) (2017): 145–151.

de Broglie, L. "La mécanique ondulatoire et la structure atomique de la matière et du rayonnement." *Le Journal de Physique et le Radium*, 8 (6) (1927): 225–228.

de Broglie, L. *Non-linear wave mechanics, a causal interpretation*. Elsevier Pub. Co., 1960.

Fort, E., Eddi, A., Boudaoud, A., Moukhtar, J., & Couder, Y. "Path-memory induced quantization of classical orbits." *Proceedings of the National Academy of Sciences of the United States of America*, 107(41) (2010): 17515–17520.

Grossmann A., Morlet, J. "Decomposition of Function into Wavelets of Constant Shape and Related Transforms." *SIAM J. Math. Anal. World Scientific*, Singapore, 3 (1980): 723.

Mazzola, A. "La controversia sulla teoria dei quanti e la scuola di Lisbona." *'Physis' Casa Editrice Olschki of Florence on Behalf of Domus Galilæana of Pisa*, Vol. 50, No. 1-2 (2015): 401-430.