

Extrait du Rhuthmos

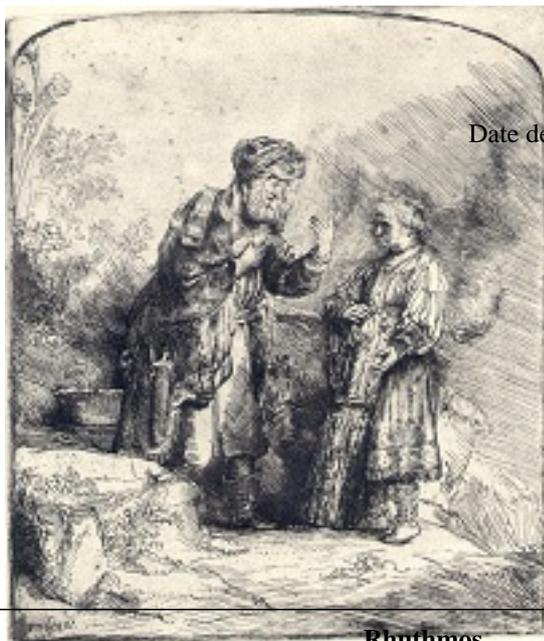
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# Edgar Morin and the Rhuthmoi of Information - Part 2

- Recherches

- Le rythme dans les sciences et les arts contemporains
- Linguistique et théorie du langage - Nouvel article

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# Informational Model of Genetic Actualization of Life

This new perspective Morin called now "*meta-informational*," that is to say, a perspective that "*only develops if integrated, articulated, and 'surpassed' [within the framework] of a complex theory of organization*" (p. 322, my mod.). In order to reach higher level of complexity, communication theory needed to be grounded on the "generativity of information." In other words, it was to be started from the observation of life.

To prove his case, Morin used first an evolutionary argument concerning the emergence of life. The extraordinary temporal distance maybe more than a billion years "between what we know about the start (the production of nucleotides and amino acids in laboratory "reconstitutions" of "primitive soup") and what we know about the arrival (a unicellular procaryote having cytoplasm and genes inscribed in a RNA)," (p. 322) has often been explained by the extremely low probability that random encounters would end up in the combinatory association of large chemical assemblages (p. 323). But, Morin argued, this view resulted from "the atomizing paradigm which struggle[d] to conceive the assemblage of a grand mechanical game" and should rather be substituted with "a paradigm of active organization founded on the recursive, retroactive, negentropic properties of the loop producer-of-self" (p. 323). The former conception underestimated the possibility of "the very precocious upsurge of one or several organizations producers-of-self, of vortical form, and whose developments and mutual proto-symbiotic integrations would lead to a communicational-informational organization" (p. 323). Yet, based on the latest thermodynamics discovery by Prigogine, we should admit that the generative power of the *physis* was certainly greater than we thought. Therefore, information had most probably been, right from the start, part of the generative circuits that progressively produced the new beings.

From the moment we become aware that life cannot be born from the miraculous apparition of information, then we have to think that information is born of the complexification of a proto-biotic organization, which, thanks to this complexification, is going to be organized into life. (*Method*, vol. 1, 1977, trans. J.-L. Roland Bélangier, 1992, p. 323)

Morin then envisaged the continuation of the evolutionary process that spanned between the first informational loops that formed in proto-living beings "as soon as one agent (the base in RNA) [became] a signal for the other agent (enzyme), and conversely [...] in a dialectic of mutual engrammation term for term," (p. 327) and the present human language endowed with "double articulation." The latter, he claimed, was only the latest and most complex result of the former. The universal "double articulation" of current human languages, discovered by André Martinet (1908-1999) (*Éléments de linguistique générale*, 1961), that is the twofold structure of the stream of speech, which

could be primarily divided into *meaningful* signs (like words or "morphemes"), and then secondarily into *distinctive* elements (like letters or "phonemes"), had already emerged during the "biotization" period.

*As hominization is a total process of ecological, genetic, organismic, cerebral, sociological transformation, a process of life style, with the creation and development of technology, of culture, in which the constitution of language with a double articulation is an aspect both total and partial of this process, so we must conceive "biotization" as a process of unheard of interferent developments, wherein arises the informational apparatus with double articulation. (Method, vol. 1, 1977, trans. J.-L. Roland B elanger, 1992, p. 327, Morin's italics)*

Indeed, "a phenomenon of saturation" of the response by the bases of RNA to the protein demand, combined with the "generative principle" involved in matter, had most probably brought this mere exchange of signals to a higher level of complexity by "constituting a meta-system with a double articulation" now able to support life development "*ad infinitum*."

This first pre-informational double engrammation defends and fortifies the chemical machine. But, with the developments of complexification, the combinations between the bases of RNA are not numerous enough to respond to the protein demand and a phenomenon of saturation appears. [...] We can imagine, [like in the case of the origin of the double articulation of human language], a pressure for variety, emanating from phenomenal needs ever more varied and complex, by the trickery of proteins whose combinations can vary *ad infinitum*, on a restrained number of "saturated" bases which could respond to the increased needs only by constituting a meta-system with a double articulation, in which these bases, becoming the equivalent of the letters of an alphabet, will be able in their turn to be combined *ad infinitum* on the level of the second articulation. (Method, vol. 1, 1977, trans. J.-L. Roland B elanger, 1992, p. 327)

This allowed Morin to articulate his information and communication theory with his previous individuation and self theory. Indeed, the very first emergence of this new system of communication resulted in the production of and was, at the same time, triggered by the materialization of *auto-re-organizing* machine-beings. In other words, living organization and information had inseparable origins.

The linkage of the double articulation in the early biotization processes and in the late human language allowed also Morin to ground again humanity in *physis*. Every existing living being and every species of living beings, whatever its level of complexity, was, according to him, the result of a common evolutionary, creative and complexifying information process.

It should be noted here that such claim was actually not completely consistent. It compared the differences between "a restrained number of 'saturated' bases" with those between "the letter of an alphabet." However, what Martinet had underlined (after the formative studies of the 19th-century Polish scholar Jan Baudouin de Courtenay (1845-1929) and those of the Prague School during the inter-war period), was the universal existence of phonological differences that entailed phonemes, that is sounds. This fundamentally sonorous aspect of human language, that was to be put at the heart of his own *rhuthmic* theory by Henri Meschonnic, was completely disregarded by Morin. As we shall see, it was also criticized by Deleuze and Guattari who recalled the opposition of Fran ois Jacob to the assimilation of genetic code to a language.

But there was another problem that Morin, this time, was well aware of. This association had been most often interpreted in purely technical terms. The sequences of nucleotide bases inscribed in DNA were viewed as "messages formulated according to a code," and "constituting the programs" that were driving *ne varietur* through "strictly stereotyped performances" the development of life (p. 329).

Instead, he suggested coming back closer to the *rhuthmic* theorists of language to consider that this automatic aspect was subordinated to a larger "*strategic*" behavior enabled by an "*organizational competence*." The implementation of genetic messages could result in a range of behavior that was much larger and freer than expected.

The whole of a genome represents rather an *organizational competence* whence emanate *strategies* (plurality of behaviors developing and modifying themselves in function of random circumstances, in order to attain finalities). (*Method*, vol. 1, 1977, trans. J.-L. Roland Bélanger, 1992, p. 330)

This "strategic" re-actualization of genetic messages was quite comparable to the use of "informational archives" during the "phenomenal existence" of living beings.

Informational archives constitute a *memotheque* from which the apparatus draws diversely according to the needs and problems signaled to it and which concern reorganizations, internal productions, behaviors, etc.; namely all phenomenal activities. (*Method*, vol. 1, 1977, trans. J.-L. Roland Bélanger, 1992, p. 330)

Moreover, it was also comparable with the process of rememoration in the brain: in both cases, DNA sequences or neuro-engrams did not contain the life-process implementation or the remembering of a memory-image but were only the starting points of re-creative processes addressing some phenomenal situation. A similar *rhuthmic* view was, as a matter of fact, to be expressed concerning the functioning of memory in the brain, at the end of the 20th century, by Gerald Edelman and Giulio Tononi (2000) (see Michon, 2011).

In both cases, the image [in memory] here, the [genetic] "model" there, are only present virtually. In both cases, there must be activity of the entire apparatus for the regeneration to take place; we have seen this in what concerns genetic information; in what concerns mental rememoration, there must be activity of the entire cerebral apparatus [...] For the engram does not *contain* the memory-image. The image is reformed at the time of the rememoration, when the psycho-cerebral set remembers, thanks to the engrammed outline. This memory is a resurrection or imaginary re-production of the event remembered, according to processes still unknown. (*Method*, vol. 1, 1977, trans. J.-L. Roland Bélanger, 1992, p. 335)

## Informational Model of Ecological Actualization of Life

After having considered the informational living machines in their genetic actualization, Morin finally considered them in their eco-systems. Indeed communication was not only intra-organismic; it also entailed the whole ecological niche in which they lived. Since any living being, the unicellular included, "interpret[ed] events in the environment as signals, from the beginning there [was] geno-pheno-eco-communication" (p. 339).

At first very embryonic, communication with the exterior, eco-communication, is going to develop. Organisms more and more evolved, beings more and more cerebralized are going to discern more and more the events of an eco-system more and more diverse, and translate more and more events into information on nourishment, danger, etc. (*Method*, vol. 1, 1977, trans. J.-L. Roland B elanger, 1992, p. 340)

This original "eco-communication" with the environment grew with the cerebralization into a "social communication" with the other individuals of the same species. The eco-systems thus became "extraordinarily complex communicational universes."

With the apparition and development of sexual communication and social communication, the individuals themselves will emit signals to indicate their presence, to look for their partner or congener, to warn them of risks or chances which may befall. Social communication develops somewhat in all the evolutive branches and especially in insects, ants, termites, bees. The brain, epi-generative apparatus, real machine for capturing, storing, processing information, develops in vertebrates, fish, birds, mammals. Eco-systems, that is to say complex unities spontaneously organized starting from interactions between living beings populating an ecological nook (cf. v. II, ch. 1), become extraordinarily complex communicational universes. (*Method*, vol. 1, 1977, trans. J.-L. Roland B elanger, 1992, p. 340)

In those eco-systems, the systems of communication "multipl[ied] and complexif[ied]." On the one hand, they used "sonorous, visual, chromatic, gestural, mimetic, ritual" means. On the other hand, they overcame their binary limitation to "incitation or inhibition" and "transmit[ted] calls, suggestions, alarms."

The supports and systems of communication multiply and complexify. The signals emitted or exchanged are no longer only chemical, but sonorous, visual, chromatic, gestural, mimetic, ritual. Communication no longer has only a constraining value of incitation or inhibition; it also transmits calls, suggestions, alarms. (*Method*, vol. 1, 1977, trans. J.-L. Roland B elanger, 1992, p. 340)

Ethologists have shown, Morin noted, that, due to the struggle for life, information became more and more "equivocal and ambivalent."

As information becomes more and more grasped by the enemy becoming more and more intelligent, as the enemy extracts information from our trails, marks, odors, etc., to get a fix on us, then camouflage, lure, ruse develop conjointly with the art of detecting camouflage, lure, ruse. Information becomes henceforth equivocal and ambivalent. (*Method*, vol. 1, 1977, trans. J.-L. Roland B elanger, 1992, p. 340)

The final result of this random but creative evolution of the bundle life/information through the individual, the species and the eco-system was the emergence of the "anthro-socio-noological" complex. According to Morin, the latter was mainly characterized by six major components:

1. Living beings with "a cerebral apparatus of unheard-of hypercomplexity, comprising more than twenty billion neurons, possessing an enormous memory, endowed with prodigious logical, constructive, imaginative, oniric potentialities."
2. "A language with a double articulation" by virtue of which, associated with the aptitudes of the human mind, we can "construct *ad infinitum* very varied and complex noological edifices, narrations, discourses, mythologies, theories, ideologies, etc."
3. "A culture" which "in the most archaic human societies" provides "a memotheque," a collective memory of data concerning "the environment, the climate, fauna, flora, the world, man," and "a genotheque," a source of negentropy "furnishing information for all technical, practical, social, mythical operations," that is know-how and rules, norms and interdicts "which govern the organization of society and are guides to codes or programs for individual and collective behavior."
4. "The formidable rise of the State machine proper to the historical megasociety," of "its dependent [apparatuses] (army, religion)" and of "local machines" such as banks, staffs of enterprises, trusts, holdings, political machines, party machines, etc.
5. "The development of urban agglomerations where the interplay of informational communication is effected in a more and more stochastic fashion" and in an ever increasing number of communication channels and practices.
6. A "noological sphere" or "set of spiritual phenomena" which in historical societies, i.e. endowed with State and cities, grew on top of the "memotheque" and the "genotheque." This sphere was, according to Morin, the "ultimate avatar" of information and comprised "ideas, theories, philosophies, myths, phantasms, dreams" that were "beings of a new type, informational existents". (pp. 342-347)

The last part of Morin's discussion of the concept of "information" was thus meant to top his previous survey of the role of information in the genetic and phenomenal aspects of life with an examination of its larger ecological dimension. It allowed to close the loop and propose a doctrine of information that was now organized as a whole.

1. Once cleared from the various types of technical reduction, information could become the master-concept that allowed to bridge *physis*, life, and socio-anthropological sphere.

Everywhere, with the living being, in eco-systems, in animal society, and finally in the anthro-socio-noological universe, it is the same fundamental physical concept, and it is the same fundamental character: *the potential equivalence between negentropy and information* at the heart of or starting from geno-phenomenally organized beings. (*Method*, vol. 1, 1977, trans. J.-L. Roland B elanger, 1992, pp. 347-348)

2. Since information was proved to be common to all stages of the universe evolution, from the most simple biotic exchange of signals between molecules to the most complex social interactions and noological constructions, it could

now support a general evolutionary model.

3. The study of the bundle information-and-life definitively proved that far from being limited to "communication of data," information had a strong "generative aspect" that explained why it was tightly associated with the concepts of "negentropy" and "active organization."

Information can be active and reproductive only within the activity of a generative apparatus. This generative apparatus can be active and reproductive only within the global activity of communicational organization. There is, therefore, not only interdependence, but recursive relation among information, apparatus, organization of the whole. (*Method*, vol. 1, 1977, trans. J.-L. Roland B elanger, 1992, p. 349)

4. In order to fit with the requirement of the socio-anthropological sphere, it was also to be associated with the concept of "apparatus" that allowed to take into account its ethical and political side that was abusively disregarded by cybernetics and communication theory.

Let us repeat: we cannot conceive informational organization without referring to a generative *apparatus*. [...] The apparatus is the original arrangement which concentrates and *capitalizes* in itself memory, computation, programming, elaboration of strategies of the organization of *the whole inasmuch as whole*; its aptitude to transform information into program, that is to say into action, centralizes in itself a power of organizational constraint. (*Method*, vol. 1, 1977, trans. J.-L. Roland B elanger, 1992, p. 351)

After having briefly listed the successive stages of the informational building of individual and social apparatuses, Morin alluded to the example of the totalitarian regimes as controlling "all the means to express and communicate information," monopolizing "true knowledge" and directly controlling "all apparatuses, economic and other."

Every State power possesses programmer/computer power over society (power to rule, legislate, decree), strategic power (to elaborate and decide the policies to be followed) and power of command/control. The State called "totalitarian" goes farther: it concentrates in itself the official memory (the power to write the History of the past and to dictate the history of the present); the control of all the means to express and communicate information; the monopoly of true knowledge [Fr. *savoir*] at least in what concerns sociology and politics, possibly in matters of science and the arts; the direct control of all apparatuses, economic and other. (*Method*, vol. 1, 1977, trans. J.-L. Roland B elanger, 1992, p. 352)

5. Interestingly, Morin finally shifted his critique, targeting this time social sciences, especially sociology, the discipline within which he had developed his thought hitherto. Indeed, the latter were also to blame, he rightfully noticed, for not taking into account information. Science of communication and social science had been for too long alienated from each other and should learn from each other's perspective. Morin accurately pointed towards the compartmentalization of modern science and research centers, a kind of new *docta ignorantia* which had not even the excuse of looking for God.

This problematic [that of power] is doubly masked, both in its properly sociological basis and in its cybernetic organizational basis: sociological theory is unaware of communicational organization and informational power; cybernetics and information theory finally reveal the power of Information (information as "master of energy"), but in hiding the apparatuses, they hide the power of the apparatuses and power by the apparatuses. (*Method*, vol. 1, 1977, trans. J.-L. Roland Bélanger, 1992, p. 353)

Even Marx, who rightly "looked for what was generator in society," had it wrong when, according to "the only foundation the physics of his time offered," he reduced production to work and disregarded the productive power of information. Likewise, Marx had abusively focused on the only "power of class in society" without taking into account "the power of apparatuses" (p. 353). Marxism now appeared to Morin as a doctrine which had introduced some productive ideas but that was limited by believes typical from the 19th century and that should be superseded by a larger theory based on the latest discoveries of science.

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