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# Two working instances about the interdisciplinarity of sciences according to Edgar Morin

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**Abstract.** This very short note contains two epistemological remarks belonging on the wide context of the interdisciplinarity of sciences (meant according to Edgar Morin): the first one on biophysics, the second one on neurogastroenterology.

Into the wide context of *complexity of thought*, according to Edgar Morin (1990), every knowledge type is always into relationship with many other types of knowledge as well as with the related general environmental context in which it synchronically lies. For Morin, human knowledge is not a mere "quantitative sum" of disjoint disciplinary contents into the mind, but rather it should be the outcome of a meaningful correlations amongst them, with the critical comparison of each other, in such a manner to try to highlight possible convergences and divergences amongst them, identified through a their sight from different standpoints, stances or perspectives. Such a remarkable wide epistemological view of knowledge, according to Morin, should be the real route to be pursued by every scholar, above all in relation to the comparison amongst the scientific disciplines and the humanities, trying also, where is possible, to take into the right account the emotional and affective counterparts with the reflexive one (Galanti & Sales, 2017). So, assuming this notable Morin's perspective, in what follows, we shall try to cast a possible bridge among different disciplines in the spirit of such a direction with which to look at knowledge and its unavoidable complexity, with time ever more increasing, providing two simple instances of working application of such a methodology of study.

## 1. Entropy and brain evolution: a simple didactic remark

With the acquisition of upright position by early humans, a great change in physiological perception system took place. This latter became much more receptive of external stimuli from environment. In turn, this entailed an ever more increasing reception of information by nervous system, whose brain, meant as the pivotal control and elaboration centre of information, may be formally moulded by a biological neural network made by neural circuits. To manage such an ever increasing information quantity coming from environment, this neural network was forced to increase its functional and structural setting, with the formation of new cerebral areas and brain connections (neural circuits).

On the other hand, such increasing of input information (from environment) has implied, from the formal standpoint, a decrement of entropy (by basic Shannon's identity  $I = -S$ ) or an increasing of the so-called *negentropy* (following Erwin Schroedinger), hence, according to modern theory of informational and chemical-physics entropy, an increasing of either biological and physical order, with – in particular – a net complexification of the brain neural network. In conclusion, the greater embodiment of information through a more receptive physiological perception system, might be hypothesized having been one among the main biophysical causes for the network complexification of brain system of early humans. That, in agreement, for instance, with Dean Falk theory of human brain evolution and the thermodynamics of self-organization in biological systems.

## 2. Neurogastroenterology, psychoanalysis and other

In regard to the peripheral nervous system of a human being, which basically comprehends the somatic nervous system and the autonomous nervous system, this short note is aimed to put forward

a possible relationship about some recent progresses of the neurogastroenterology and the classical psychic development of human being according to Freudian psychoanalytic theory.

To be precise, the pioneering work of Michael D. Gershon and co-workers (1998), has clearly pointed out the truly crucial role played by the enteric nervous system, as a part of autonomous nervous system besides the sympathetic and the parasympathetic one, in influencing central nervous system. Ontogenetically, the enteric nervous system has its starting point in the neural crest, next to a cells aggregate which will give rise to the central and the other parts of peripheral nervous system by neurulation at the embryonic stage. It starts since intrauterine life and goes on in the postnatal one, due to the plasticity of infant's nervous system. In particular, serotonin, besides to be the main neurotransmitters of enteric nervous system, is deemed to be an important nervous grow factor for the same enteric nervous system. Furthermore, the growth of the latter is closely related with that of the immune system, and vice versa. Nevertheless that, enteric nervous system is quite independent of central nervous system, although this latter may control the former through the sympathetic and the parasympathetic one<sup>1</sup>.

But, as pointed out in (Iurato, 2021), it would be interesting<sup>2</sup> to enquire deeper the possible further connections and inter-relationships existing between enteric and central nervous system from either the ontogenetic and the phylogenetic standpoint, after the first neurogastroenterology discoveries on the close correlations between brain and intestine. This view is in agreement with the modern sight of human being as a complex biological system whose consciousness is the outcome of the suitable correlations of the many and independent local control centres<sup>3</sup> laid out in various different parts of human body, among which is the intestine and the gastroenteric system in general. At the present, it is the so-called *psycho-neuro-immuno-endocrine conception* that explains better biological human life<sup>4</sup>.

Finally, a deeper understanding of the real connections between enteric and central nervous system might turn out useful also for the Freudian psychosexual development of human psyche where some of its stages (i.e., the oral and anal one) just concern gastroenteric system. In particular, this psychic development relies, from a physiological stance, on the ontogenetic development of the peripheral nervous system of human being. From this, also further links with psychoanalytic psychiatry might be described once ascertained deeper will be the possible two-ways connections between enteric and central nervous system.

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1 In this regard, it is also useful to see the so-called *polyvagal theory* by Stephen W. Porges (2011).

2 Also from the evolutionary biological and paleoanthropological standpoint, for example starting from the notable research line drew by S. Boyd Eaton and Melvin Konner (Eaton & Conner, 1985).

3 See, for example, the latest Vittorino Andreoli conception of human consciousness based on the so-called *correlates theory* (Andreoli, 2021).

4 See the Preface to the Italian edition of (Gershon, 1998) by Umberto Solimene.

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