

Translation by Patrizia Rustichelli-Stirgwolt

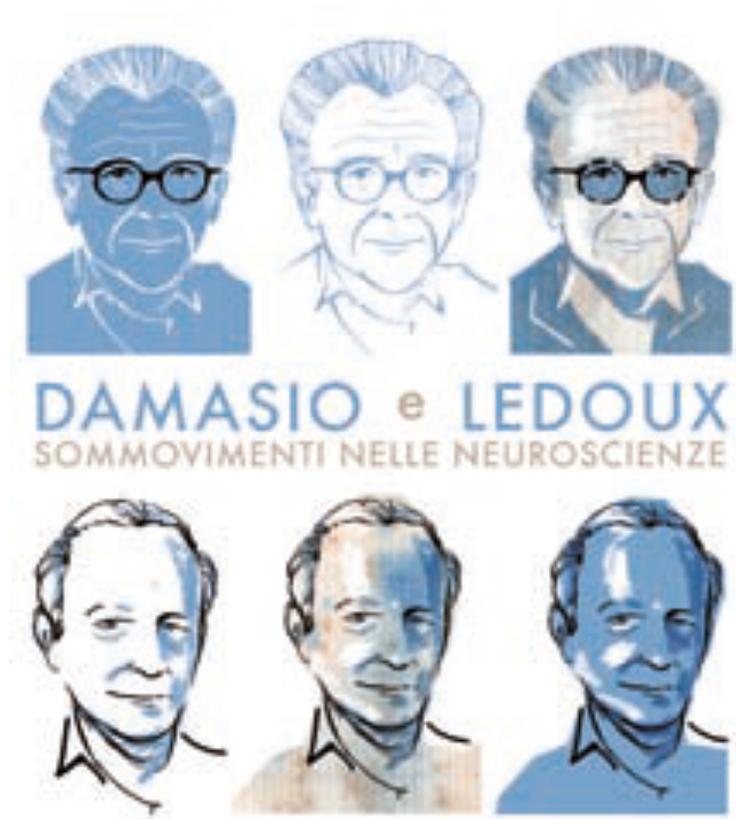
The review of the Italian association of psycho-neuro-endocrine-immunology

Edited by Francesco Bottaccioli

PNEI NEWS

The new knowledge of science and health

DAMASIO AND LEDOUX Upheaval in neuroscience



Pnei News – bimonthly review – nr 3-4 – year XII– May - August 2018

PNEI NEWS NR 3 – 4 – May- August 2018

EDITORIAL

Page 3. Upheaval in Neuroscience

Francesco Bottaccioli

NEUROSCIENCE/DAMASIO

Page 6. Antonio Damasio to PneiNews: mind is not identified with the brain

Paola Emilia Cicerone

NEUROSCIENCE/LEDOUX

Page 8. Amygdala and fear. How my ideas have changed.

Joseph LeDoux

MEDICINE

Page 10. The microbiota revolution. An interview with Antonio Gasbarrini

Paola Emilia Cicerone

Page 13. Depression and thyroid function: a strong and bidirectional link

Mauro Bologna

SPORT

Page 16. PNEI paradigm for sport activity

Marco Bruscolotti, Marco Chiera, Nicola Barsotti

BOOKS REVIEW

Page 19.

SPECIAL ISSUE: LOW BACK PAIN AND INTEGRATIVE TREATMENT

Page 21. Chronic low back pain: the breakdown of the medication/surgery practice

Page 22: The state of art

Nicola Barsotti, Marco Chiera, Diego Lanaro

Page 25. Low back pain: the osteopathic neurophysiological approach according to PNEI paradigm

Page 28. Physical exercise and massage in chronic low back pain

Page 31. Chinese Medicine and chronic low back pain

Page 34. Pain, mind, emotions: a complex and multi-dimensional relation that requires a synergic treatment.

EDITORIAL

Upheaval in Neuroscience

Francesco Bottaccioli –Director, Pnei Professor for Post Graduate Formation, University of Aquila and University of Turin

Many a time I have discussed about the paradigm dominating the neurosciences since their beginning. In brief this paradigm views the nervous system as the coordinator of the organism and the brain being its master. Thanks to the natural selection, the brain has implemented modules based on specialized neurons which respond appropriately to the internal and external inputs.

This leads to two crucial consequences: the mind is identified with the brain, thus, in order to know the mind activity (cognitive and emotional), it suffices to know the activity of the neurons. The brain as master of the organism is neither influenced by the psyche's activity nor by behaviours or activities of the body's biological systems.

This paradigm has been supported along decades by the works of many scientists, psychologists and mind philosophers¹. The works of two distinguished and influential neuroscientists such as Antonio Damasio and Joseph LeDoux have strongly lead the way in the neuroscience field especially regarding two aspects. In his "Descartes'Error" (1994), Damasio highlighted the centrality of the body since "the body is the main occupation of the brain", whereas in his "The Emotional Brain" (1996) LeDoux points out the centrality of emotions during a period characterized by a strong cognitive rationalism. Despite being milestones on the path of knowledge, these two works did not undermine the dominating paradigm. In fact, in all his works, Damasio has confirmed the hierarchical role of the brain. The body is certainly the main occupation of the brain which constantly maps all its activities without being influenced by it.

With his studies on amygdala defined as the area of fear, LeDoux reinforced the modular vision of the brain and the identity brain-mind in the sense that by conceptualizing those researches one might conclude that emotions are innate reactive schemes, implemented in deep areas of the brain, the so called mammalian brain, heritage of the evolution of the species, described by McLean in his triune brain theory.

LeDoux's self-criticism

In the text at page 8-9 of this issue the New Yorker scientist confesses that "at the congresses I was described as the person who had discovered the way our brain generates our fear sensations which is what I did not do at all. That is why I started writing to clear with no shades of doubt my position regarding this point". This position needed to be cleared because, as LeDoux himself explains, there was some confusion generated by his same writings. "In the last 3 decades I have studied how the brain identifies and responds to threats. I named the cerebral system involved in this task as the system of fear. It was a mistake². This mistake was corrected by identifying the circuits.

In 2012 with an article published on *Neuron*³ LeDoux makes the fundamental distinction between defensive circuits based on the amygdala and the emotion of fear which is elaborated on a cortical level.

Recently in a important article published on a review of the American National Academy of Sciences⁴, LeDoux attacks directly the dominating paradigm and its creators from Darwin to Panksepp and Damasio's "Descartes'Error".

Here LeDoux criticizes the "conventional view which argues that emotions are innately programmed in subcortical circuits" and instead proposes that "emotions are higher-order

states instantiated in cortical circuits. What differs in emotional and nonemotional experiences is not that one originates subcortically and the other cortically, but instead the kinds of inputs processed by the cortical network". Hence emotions are built up starting from recording and interpreting the signals coming from the activation of the defensive circuits but they find their meaning in the psychological interpretative categories of the subject.

Damasio's self-criticism

In his last book and the interview he gave us (pages 6-7 of this issue), Damasio criticizes explicitly the hierarchical view of the human body based on the brain. He reconstructs the network connecting the central nervous system to the peripheral nervous system and (for the first time in his writings) also to the other biological systems and markedly the immune system. It follows a clearly PNEI framework. In fact, to our interviewer Paola Cicerone, Damasio states that "PNEI means implementing, in health and medicine, the scientific comprehension of the whole regulatory systems of the organism".

Like LeDoux, Damasio too hints to self-criticism while criticizing cognitivism both in its classic form and in its modern version as artificial intelligence. His pages on the intestine and its enteric nervous system are emblematic. In his "The Strange Order of Things" Damasio writes that "the enteric nervous system is rarely considered in medical school courses and, when this happens, it is generally described as a peripheral component of the nervous system. Only recently they have started to study it more thoroughly. It nearly lacks in scientific writings about homeostasis, feelings and emotions. Also in my breakthroughs in those areas the references to the enteric nervous system are quite cautious". Thus Damasio himself admits that he has been very careful in appraising the importance of the enteric nervous system.

It is worth asking why.

One answer could be related to the novelty of the topic: until recently very little was known about it. And yet things are not always what they seem. Actually the first modern monograph on this theme dates back to 1987. Two extensive scientific reviews appeared in 1994 while in 1996 the *New England Journal of Medicine*⁵ (a review that does not remain unobserved) published a thorough report on the *Enteric Nervous System* which included the clinical implications as well.

As a matter of fact, in the first edition of my book "Psychoneuroimmunology" (September 1995) a paragraph entitled "Also the stomach has got a brain" was devoted to the subject and included some references and clinical cues resulting from this new knowledge. (New at that time, as I started writing at the beginning of the Nineties)⁶. Thus a quarter of century ago there were already initial and well supported evidences. Why did not Damasio see them? Because he did not have the glasses to see them. He was lacking a systemic paradigm that would light up all the bi-directional connections in our organism. His research lay inside the dominating reductionist paradigm.

There is no self-assurance in what I write. This is a fact in the history of science and evolution of ideas that allows me to complete the discussion by tackling what, in my opinion, are the persisting critical points in the most recent development of the American scientist.

The critical points: looking to the future of research

Homeostasis. The entire last book of Damasio glorifies homeostasis seen as the real engine of life's evolution. The risk I see here is to replace the neodarwinist concept of the "blind force of natural selection" with the "untamable and unintentional force of the homeostasis (the Spinoza's concept of *conatus*). This possible drift can be avoided by introducing

epigenetic in the theoretic scheme of homeostasis, namely taking into consideration the retroaction of the social and physical environment on the human organism. A response that uses individual and collective behaviours, social, scientific and cultural structures: in short, the human acting as evolutionary force.

Feelings. Also in his last work, Damasio insists on the body homeostatic foundation of the feelings. His proposal is certainly of historical importance as it opened the way to the study of interoception in an integrative viewpoint. Yet, As Lisa F. Barrett underlines, feelings and emotions can not be reduced to the activity of homeostasis based on the binary pleasure/pain track: they arise mainly by the intense work of the mind that imagines, simulates, predicts. "These simulations – writes Barrett – become feelings"⁷.

Human nature. The approach is the realistic one with no angels and no devils. We can certainly agree with Damasio's clear analysis about the negative changes in human nature due to the current worldwide socio-economic and political crisis represented also by psychopathic people in power positions everywhere in the globe. Yet, for the picture to be complete, it is necessary to analyze the current model of society and its systems of power. Otherwise the impression is that the current troubles are just due to an individual cultural defect and not to social economic systems dominated by private individuals who pursue their own profit generating social isolation, cultural illiteracy and emotional ignorance beside destroying the Earth ecosystem, the physical substrate for human life.

These are themes of great significance and interest. Unfortunately they have not been approached in a clear and satisfactory way until now. This does not mean that they should be avoided. To prevent the catastrophe outlining at the horizon we need a wider and more comprehensive scientific approach that includes all human dimensions through a leap forward advancing in the ability of responsibly organizing human life.

1. For a complete picture, see: Bottaccioli F, Bottaccioli AG (2017), PNEI e scienza della cura integrata. Il manuale, Edra, Milano, chap. 7
2. LeDoux J (2015) Afterword. Emotional construction in the brain, in: Barrett F.L., Russell JA (eds) (2015) The psychological construction of emotion, Guilford Press, New York, p. 460
3. LeDoux J (2012) Rethinking the emotional brain. *Neuron* 73(4):653–676
4. LeDoux J, Brown R (2017) A higher-order theory of emotional consciousness, *Proc Natl Acad Sci U S A* 114(10):E2016–E2025. doi:10.1073/pnas.1619316114. Epub 2017 Feb 15
5. Furness JB, Costa M. (1987) The enteric nervous system. New York: Churchill Livingstone, 1987.
Gershon MD, Kirchgessner AL, Wade PR. (1994) Functional anatomy of the enteric nervous system. In: Johnson LR, ed. *Physiology of the gastrointestinal tract*. 3rd ed. New York: Raven Press, 381-422.
Costa M, Brookes SJ. (1994) The enteric nervous system. *Am J Gastroenterol* 1994;89: Suppl:S129-S137
6. Raj K. Goyal, and Ikuo Hirano (1996) The Enteric Nervous System. *N Engl J Med* 334:1106-1115
7. Bottaccioli F (1995) *Psiconeuroimmunologia*, RED, Como, p.18-19, see also pages. 224-226 about the description of the communication between the two brains.
7. Barrett F.L. (2017) *How the emotions are made*, Houghton Mifflin Harcourt, Boston, p. 71