

Neurology and the Clinical method: between science and patients

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Clinical method: first step

- Accurate elicitation of symptoms, id est of patient's history
- Accurate elicitation of signs, id est to perform a good neurologic examination

Clinical method: second step

- Interpretation of symptoms and signs in terms of physiology and anatomy

Clinical method: third step

- Syndromic formulation and localization of the lesion
- This step corresponds to the anatomic diagnosis

Clinical method: fourth step

- Anatomic diagnosis +
- Mode of onset and course +
- Other medical data +
- Appropriate lab tests and diagnostic exams
 - allow
- Pathologic or etiologic diagnosis

Clinical method: fifth step

- Choose the best treatment
- Obtain confirmation of the diagnosis through clinical follow-up and therapy effectiveness or discuss diagnosis

The core of the clinical method

- Since the beginning of the examination the MD asks himself what's the meaning, that is, what's the hidden unifying factor that allows us to understand all the events, the relations between them, their concatenation: it is called diagnosis. It is the name of a disease already known and described that best explains the particular case the MD is examining

The core of the clinical method

- The diagnosis is a discovery! All of a sudden, no-one knows exactly how and when, it appears to our eyes, to our consciousness. And one is tempted to say: “Why didn't I think of it before?”

The core of the clinical method

- What kind of knowledge is the clinical method, the clinical experience?
- It is a kind of workout, of a developing an attitude to look for the unitary meaning of symptoms and signs. Having already tackled some cases of the same disease and made diagnoses of real cases, greatly facilitates the task

The core of the clinical method

- You are not always able to make the diagnosis, sometimes even after the autopsy
- The adventure of discovering new diseases has no end, and you never fully understand the already known; you need always to deepen your knowledge and each patient is somehow unique
- When clinical method was discovered and developed?
Between 1760 and 1870

History

- A book by a philosopher, an epistemologist, Michel Foucault, «The birth of clinical medicine» has emphasized the absolute importance and the incredible revolution of this event in the development of modern Medicine

History

- Gian Battista Morgagni was born in Forlì the 25th February 1682
- He is considered the founder of modern pathological anatomy
- He was defined by Rudolf Virchow the *father of the modern pathology*
- As «His anatomy Majesty» was known Morgagni in Europe

History

- In 1761 Morgagni published his major contribution to medicine, *De sedibus et causis morborum per anatomen indagatis* (about disease location and causes through anatomy): he was the first to establish the correlation between anatomical observation and clinical practice, shifting the accent from the disease nature to disease localization

History

- Jean Martin Charcot the founder of modern Neurology in 1860-70

Clinical method and science

- In such a method, where does the observational experience integrate with the progress of scientific knowledge, of the biological science?
- It is called etio-physio-pathology
- The best example of it is the discovery of microbes as the cause of infectious diseases made by Pasteur. This discovery has also allowed us to understand the mechanism of tissue and organ damage, the development of symptoms, their progression, and to find effective treatments

Clinical method and science

- We do not know the cause of a large number of diseases, but we do know their pathogenetic mechanisms. In the cases where the cause of the disease is unknown, the pathological picture has been the most useful tool for identifying the disease
- These notions and the medical and biological discoveries allow us to better understand the symptom patterns and their evolution and to use therapies more efficiently

Clinical method and science

- Why is the clinical method seen nowadays as subjective, coarse and to be overcome? How has this criticism developed and what is suggested as an alternative?

The introduction of statistical-epidemiological methods

- The Clinical Method has dominated unchallenged until the '90s
- However, the origin of the criticism has older roots
- In the '50s and '60s, many resources began to be available in the health field. The public medicine, mainly aimed at vaccination before, was being extended to the study of populations. Statistical and epidemiological methods were being defined

Statistical-epidemiological methods

- These methods are applied not only to infectious-epidemic diseases, but they are even suggested as a scientific methodology for the identification of the still unknown causes of disease
- The aim has soon been adjusted and it has been understood that epidemiological investigations generate etiological hypotheses, which then have to be tested by biological methods

Statistical-epidemiological methods

- We have had the flowering of occupational medicine, whose discoveries have been, however, much reassessed (only few selected diseases are due to environmental factors, which are generally very precise and specific)
- In the past 20 years, the epidemiological medicine has known a new flowering linked to the molecular epidemiology

Statistical-epidemiological methods

- It is clear that the statistical-epidemiological medicine is not a clinical medicine; it can contribute to a more precise and accurate description of the distribution of the disease in the population (incidence and prevalence), the onset and development of symptoms (thanks to large numbers!), its possible relationships with the environment, with medical practices, with the use of medications
- These notions enrich the clinical knowledge, but they must be integrated into it in order to be useful to the individual patient in daily medical practice

The advent of evidence-based medicine

- At the beginning of '90s a new approach to medical problems was developed
- The number of medical publications grew in such a way that up-dating for MD became very difficult
- Moreover, publication quality in spite of peer reviewing was no more satisfying

Evidence-based medicine

- The number of scientific studies, clinical trials of efficacy of drugs and especially preventive medications, such as the use of aspirin as antiplatelet and, therefore, preventive of strokes and heart attacks, i.e. drugs whose effect could be demonstrated only in survey on populations of thousands of people observed for years in relation to placebo, has grown in number and complexity of statistical methods, so as to become impossible for most physicians to keep up to date properly

Evidence-based medicine

- That is why the evidence-based medicine was born: a group of scientists, statisticians, epidemiologists and specialists in various branches got together and did a meta-analysis of the various articles, considering them carefully from the point of view of their "scientificity" (quality), and suggested conclusions, which are clear, concise and can be easily understood by all MD. The soundness of this operation, as it was started, is evident

Evidence-based medicine

- However, the application of such a methodology has raised the question about the scientific nature of many medical and surgical practices, if not all

Evidence-based medicine

- It has immediately become clear that medicine as such, that is its method - the clinical method we are talking about, - is not assimilable to the "scientific" evidence sought by the evidence-based medicine and this has sown seeds of doubts about its being a scientific method, a scientific knowledge
- Only what is verified through the evidence-based medicine methodology should be considered scientific, objective, accepted by all, by the scientific community

Evidence-based medicine

- The very way in which diseases are described has changed: first the stress was on their etio-patho-physiology, now epidemiology and the list of all the symptoms with their frequency of appearance in relation to the various stages of the disease is emphasized. The diagnosis is ideally reduced to a comparison between lists of signs and symptoms and their frequency in various diseases

Evidence-based medicine

- Moreover, the weight and value of diagnostic tests, which are also called “objective” in contrast with the subjectivity of the clinical method, have totally changed. In fact, today doctors tend to expect the diagnosis from these tests

Evidence-based medicine

- The several diagnostic test specialists, such as neuroradiologists, experts in electro-encephalography, eco-Doppler, electro-myography, vestibology, neurophthalmology have regarded themselves more and more as the owners of diagnostic capability, as super experts in small areas of neurological diseases, or experts of diagnostic methods, especially the imaging, which are apparently powerful and scientific in formulating diagnoses

Evidence-based medicine

- It is really interesting to note that, in spite of the objectivity of the neuroimaging methods, pictures and data must be interpreted by an especially-trained medical doctor
- I don't see why medical interpretation of a brain MR should be more objective than a clinical diagnosis, that is the examination of the patients in all his aspects!

Evidence-based medicine

- From this comes a mentality that produces diagnostic and therapeutic flow-charts, protocols recorded and shown to the public controllers, guidelines, consensus conferences. In order to be useful to the individual case, all these tools must be used within the clinical method, by the clinical experience of the doctor examining that peculiar patient

Evidence-based medicine

- The main issue is that all these tools are useless in reaching the diagnosis, do not improve diagnostic capacity; they are useful in verifying diagnostic process, hypothesis!
- But you need a doctor who conceives the diagnostic hypothesis!

Evidence-based medicine

- It is important to notice that all this change in method and mentality has not been led by doctors working in the field with patients, but it has been proposed and supported by specialists in statistics, epidemiology, neurophysiology, neuropsychology, neuroscience, computer science, who have obviously no competence at all in dealing with the real patient who calls for the MD

The current main stream in health care

- Thus, we have come to a paradoxical condition: the organization of medicine - how to set the diagnostic and therapeutic path, especially the method of documentation of medical acts, the steps taken, which must be controllable, - is conceived, planned and implemented by non-medical staff or by medical staff without clinical expertise, who claim to determine the way in which clinicians should act

The current main stream in health care

- The ideal, which is not even completely put aside, is that physicians who see patients are only technicians, executors of procedures established by experts, indeed, the ideal would be to use PCs especially programmed to provide the diagnosis of individual cases
- In principle, I am not even against the self-diagnosis made through internet (patients know very well disease symptoms, they experience the symptoms!), but in the end, there must always be a MD who is responsible for the diagnosis and the medical treatment

The current main stream in health care

- Even the continuing education of the physician has become formal: it is enough to reach the annual number of credits required by the law
- You do not expect anything more from the education of the physician, from his "morality" in the sense of proper and intelligent diagnostic capability. What matters is to control his actions, and to do this he is asked to document everything, and this means an enormous bureaucratic burden, that takes away time and energy from clinical work, the only work useful for patients

The current main stream in health care

- All responsibility is offloaded on to the MD after having removed the only tool that actually works, the clinical method
- No wonder that everybody wants to avoid responsibility, that at the end of a diagnostic process with many exams, which are often unnecessary, no-one draws the conclusions, takes responsibility for the diagnosis and therapy

The current main stream in health care

- The ideal in outpatient examination has become the abolition of the personalization of the outpatient clinics, the rotation on them of many MD, which allows the MD always to defer the matter to a colleague with the play of new tests and specialist consults
- In the ER the same happens. The MD who is in charged, usually a young physician with little clinical experience, calls for various specialists, hoping that someone will admit the patient and take responsibility

The current main stream in health care

- How to get out? It is the clinicians' responsibility to claim their pivotal and irreplaceable role in medicine. The clinician must once again become the center around which all health care revolves
- Clinical method should become again the core of all the health care system

When, how and what did it happen?

- At this point we need to go to the very origin of this radical change in medical practice and organization
- Why the clinical anatomical method, that has shaped for ever the occidental medicine, is now considered unreliable?
- And what is most strikingly is that no working alternative method is available
- What did it happen?

Cognitivism and artificial intelligence

- A huge and hidden revolution in understanding intelligence has happened: computer science, artificial intelligence
- From scientific psychology and behaviorism to cognitivism
- Let's follow Dreyfus critique to AI at its very beginning back in 1972

Dreyfus' critique to cognitivism

- The most radical philosophical critique of computer science and artificial intelligence was done by Hubert Dreyfus. His major work "What computers can not do: the limits of artificial intelligence" published in 1972 still retains its validity. That Dreyfus is a critical analysis of the theoretical foundations of computer science as capable of reproducing as such human intelligence

Dreyfus' critique to cognitivism

- The assumption that man works as a computer, that is, as a facility that processes symbols, implies the following postulates
- 1- Organic postulate, according to which the neurons process the information according to discrete steps, using the biological equivalent of the process on/off

Dreyfus' critique to cognitivism

- 2- Psychological postulate, according to which the mind is seen as a device that works on bits of information according to formal rules
- 3- Epistemological postulate, which states that all knowledge can be formalized, that is to say that everything that can be understood can be expressed in terms of a logical relation, more exactly, in terms of the Boolean function, the logical calculus that governs the ways in which the bits are related according to rules

Dreyfus' critique to cognitivism

- 4- The ontological postulate: as any information you enter the computer must be in bits, the computer - model of the mind - assumes that all relevant information concerning the world, all things essential to the production of intelligent behavior must be analyzed in principle as a set of specific elements independent of the situation. This is an ontological presupposition according to which, what exists is a series of events logically and ontologically independent of each other

Dreyfus' critique to cognitivism

- None of the four postulates is justified on the basis of empirical or theoretical arguments
- It is evident and almost obvious that these postulates are false:
 - The brain does not work by bits: action potentials obey the whole/nothing law, but synapses work analogically
 - It does not work on bits of information: emotion, motivation, ideals, love
 - So many aspects of human experience are not reducible to Boolean formalism
 - Facts in the real world are not independent events, but they are connected among themselves and part of some functional unity, of a general context

Dreyfus' critique to cognitivism

- There are also three areas necessarily neglected by scholars of cognitive simulation and artificial intelligence it is necessary to explore as underlying all intelligent behavior:
- 1- the role of the body to organize and unify our experience of objects
- 2- the role of the situation that provides a backdrop against which our behavior can be ordered without rules
- 3- the role of the goals and needs

Dreyfus' critique to cognitivism

- Computer technology can successfully deal with the ideal languages and with abstract logical relations
- When the human mind recognizes objects in space and time, it does not proceed enumerating a list of isolable, neutral specific features
- Human mind does not proceed from atomic elements to totality, but grasping the parts in a whole; the notes of a melody have value because they are perceived as part of a melodic series and not vice versa, and the same applies to the elements of a sentence

Dreyfus' critique to cognitivism

- In conclusion, the pattern recognition is relatively easy for a computer if the pattern is defined by few specific traits, but in the case of complex models, the computer does not work, and this remains true also for supercomputers
- According to the phenomenology of Merleau-Ponty, humans recognize complex patterns thanks to a capacity that is actively and organically linked with the body that responds to the environment by virtue of the continuing sense of its operation and its goals

Dreyfus' critique to cognitivism

- The situation or context is the human mode of being in the world and the situation makes it possible to conduct a ordered behavior, but not subject to formal rules

Dreyfus' critique to cognitivism

- The problems with open structure, unlike the games and tests, have three tiers of difficulty:
 - Determining which facts are possibly relevant;
 - What facts are actually relevant;
 - Among these, which are essential and which are not essential

Dreyfus' critique to cognitivism

- First, in a given situation, not all facts are possibly relevant: some are, while most of them is irrelevant
- Because the computer is not in situation, it must deal with all the facts as possibly relevant

Dreyfus' critique to cognitivism

- The world or situation, as a field of experience, is structured by our tasks and is bound for our purposes which, in turn, correspond to our social and individual needs, whose activities have created the world

Dreyfus' critique to cognitivism

- It can be said that a man has values as the machine has goals: undoubtedly, men also have goals, but these are derived from a system of values and are not the final arbiters of the action, as instead are for robots

Dreyfus' critique to cognitivism

- In other words: the computers are not in situation and do not have a body, while the intelligence of human beings is always in situation and is conditioned by the fact that man has a body
- **"What distinguishes men from computers, to as designed in an intelligent way, is not an abstract universal immaterial soul, but a concrete specific material body"**(H. Dreyfus, ibid, p. 238)

Dreyfus' critique to cognitivism

- Human intelligence is always in situation and this implies an original background of beliefs, namely, common sense. These beliefs are not objectively measurable, and therefore can not be formalized or simulated; the intelligibility and the intelligent behavior must be related to the common sense of what we are, this means necessarily a kind of knowledge that can not be made explicit if we want to avoid the infinite regress

Dreyfus' critique to cognitivism

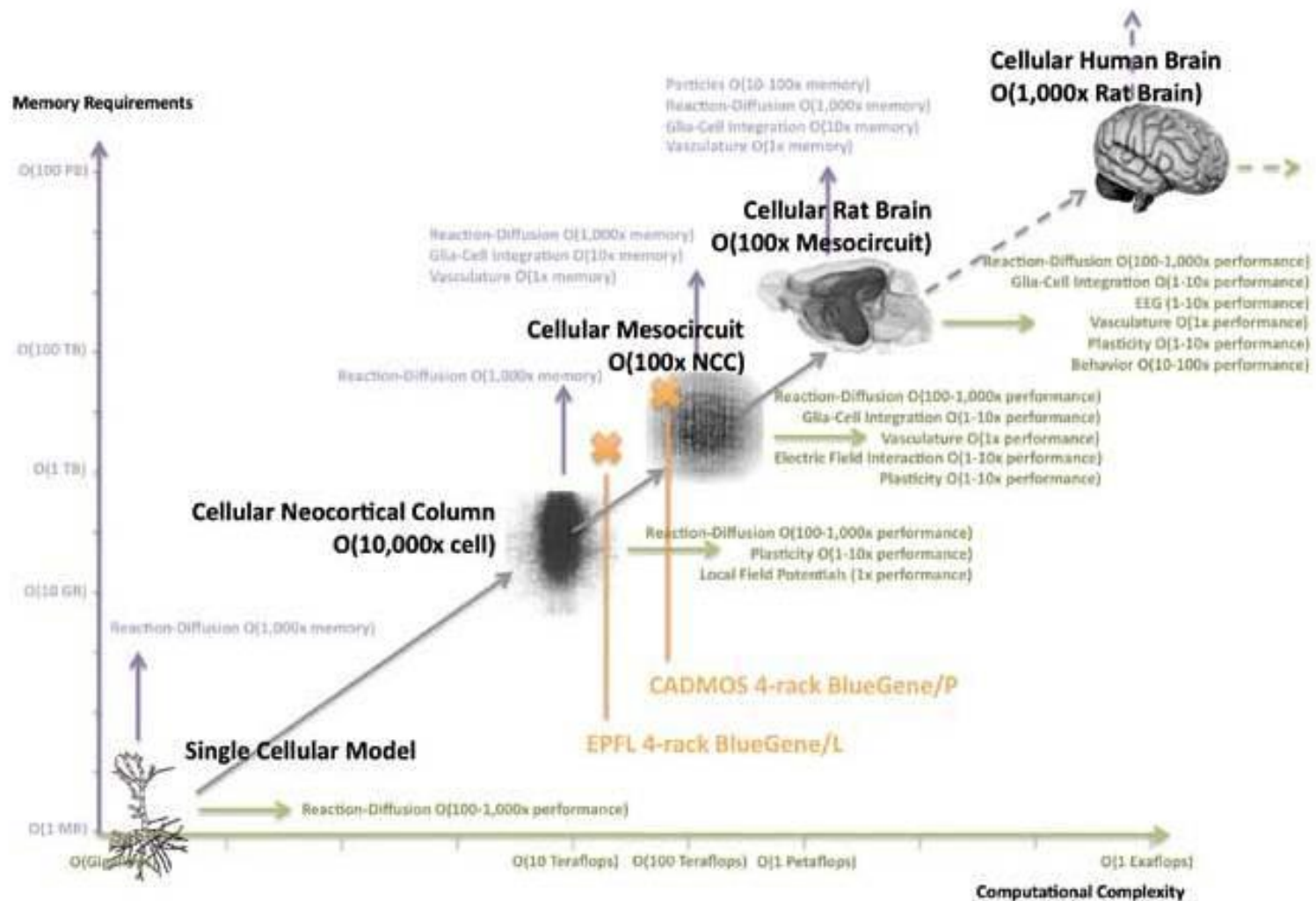
- If the computer paradigm becomes so strong that men begin to think of themselves as if they were digital devices, made on the model of artificial intelligence machines, then, since the machines can not be like the men on the grounds that we have shown, humans can gradually become like machines

Dreyfus' critique to cognitivism

- "The risk is not the advent of the super intelligent computer, but of intellectually underdeveloped human beings"
- Human intelligence is not reducible to analysis and calculation capacity. This is one aspect of human intelligence and computers were built to improve it
- Human intelligence implies capacity of synthesis, of detecting and perceiving meaning, of grasping relationships among each component of a context, of a situation

Dreyfus' critique to cognitivism

- As we already observed only human intelligence is capable of «discovery» from the scientific one to the medical diagnosis, to the right wife in real life, to the artist creation, to the killer in a murder
- No computer can do this: it may be a useful means in the hands of a human subject that retains his own real intelligence



At present

- Will Medicine survive the loss of the clinical method?
- The answer is no!
- But the problem is larger
- Will human life survive the waiver to use human mind according to all its openness and to all its possibilities and capabilities?
- It will be difficult, as it is already: the world crisis!

But fortunately

- “Nature - the flesh, bones, viscera, the cells (one might add, especially brain, neurons) – become in the human beings need of the infinite (of the meaning, of understanding relations and the unifying factor of thinks). Unlike animals, even our physiology is whole set with this opening to infinity: this opening to infinity is rooted in our humanity, for this it is ineradicable”

Which Medicine?

- The problem is not to humanize the technological medicine
- The problem is to practise a good medicine up dated with all the biological discoveries
- A good medicine means only: clinical method