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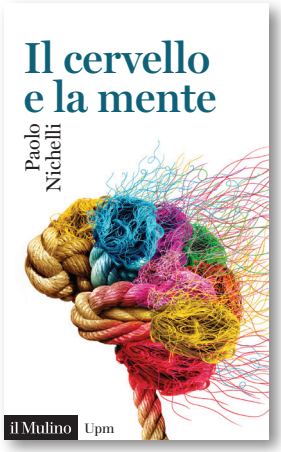
# Book Reviews, Notes and Comments

Edited by
**Federica Napolitani Cheyne**




**IL CERVELLO E LA MENTE**
Paolo Nichelli
Bologna: Società editrice
Il Mulino; 2020.
208 p.
ISBN: 9788815286628
€ 14,00.

*[Brain and mind]*

## In defense of monism

The book *Il cervello e la mente* (Il Mulino, 2020) is an easy read for almost everyone, and we warmly recommend it to our readership, including biomedical students and healthcare professionals. Written by Professor Paolo Nichelli, who directed for several years the Clinical Neuroscience Department of the University of Modena and Reggio Emilia, it provides a captivating fresco of the spectacular advances and the unresolved issues of contemporary neuroscience. In line with an eminent tradition of similar books, it aims to illustrate how the functioning of the human brain subserves who we are and how we act, and it does so by ingeniously mixing descriptions of everyday acts and behaviors with the clinical conditions that transform the same acts in insurmountable problems, such as reaching a cup of coffee for individuals affected by Parkinson's disease.

Already after a few pages, it becomes immediately clear that the author is both an eminent scholar with an incessant curiosity – he has produced a stream of landmark contributions to the field of neuropsychology – and a passionate clinician with a strong empathy towards his patients. And it is through this double lens of scientific rigour and clinical storytelling that several of the main neuroscience topics – perception, action, memory, language, consciousness, emotions – are discussed in the book.

The style is captivating. Nichelli keeps the specialized jargon to a minimum, while never surrendering to lower the standard of scientific rigour. Well-selected clinical cases are used to demonstrate efficiently the miraculous nature of the neurophysiological mechanisms subserving the brain functions that allow us to execute seemingly simple acts (often with entertaining personal examples, reported in first person by the author), and the dreadful effects of brain lesions in patients who either belong to the story of neuropsychology or have been examined directly by the author. The detailed description of clinical signs and symptoms of his patients are almost unavoidably preceded and accompanied by the personal stories and facts of the patients' lives before and after the neurological accidents that made their life different – this elegant storytelling element makes the book a truly enjoyable page turner, and puts it in the tradition of a classical and fascinating literature describing histories of patients disorders and unusual experiences.

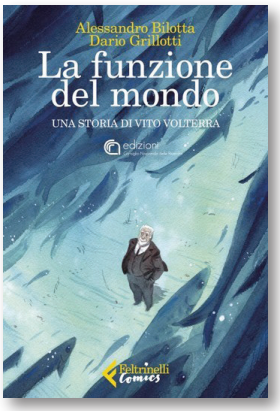
It is commendable how Nichelli, despite his deep experience with neurological patients, is never condescending, and rather conveys the humble and thoughtful attitude of the scientist facing the complexity of brain functions and the sore mysteries of their dysfunctions: he highlights with candid honesty the awful lot that we still do not understand about the relationship between brain physiology and behaviour. Another laudable, and also truly enjoyable feature of the book is the attention posed by Nichelli to the intellectual path that was followed by brain researchers and neurologists towards solving clinical mysteries and understanding how brain function gives rise to cognitive abilities. Virtually all presented topics are accompanied by anecdotical accounts of the life and intellectual trajectories of the scientists who obtained, sometimes serendipitously, big leaps in understanding how the brain makes us being what we are.

A recurring theme in the book is the breakthrough provided by the technologies that allow obtaining images of the human brain. This is no surprise given that Nichelli witnessed the explosion of instruments and methods to study the brain and its function, and the revolution brought about by CT scans in the early 70s, when brain images were only obtainable with invasive procedures such as cerebral angiography and pneumoencephalography. In subsequent years, and particularly during a residency at the National Institutes of Health in the early 90s, Nichelli contributed to the development of both structural and functional MRI, techniques that provided a real breakthrough in clinical neuropsychology. In between the two world wars, neuropsychology was relying on anatomo-clinical correlation studies in patients, in which one had to wait for the autopsy the establish the correlation of impaired functions with brain areas. Complex functions, such as the comprehension of spoken language, were localized to circumscribed areas of the brain. But it was impossible to generalize the findings observed in a single person to the population. However, as charmingly explained in Il cervello e la mente, anatomo-clinical correlation studies can only identify the individual brain regions necessary to perform a given task, not all the entire brain network involved. It was only the development of neuroimaging methods that made it possible to overcome this limitation, and dovetail the empirical facts of clinical neuropsychology with images of the entire brain engaged in

cognitive functions. This idea is pervasive in the book, which, despite the apparent dualistic stance of its title ("*Il cervello e la mente*" - "Brain and mind"), is a real hymn to monism, arguing cogently against the existence of a distinction between the brain and the mind.

Contemporary neuroscience can influence our lives much more fruitfully than in the past. The eminent cognitive neuroscientist Martha Farah advocated for an increase of "neuroliteracy", so that the average citizen has at its disposal an at least minimal degree of understanding how brain function results in behaviour. The curiosity for what is happening in our brain might be the mover for stimulating this increased literacy. The true stories of people with brain damage presented in Nichelli's book can and most often will lead readers to ask the same questions that research is trying to answer. We are sure that curious readers, even with a school-level knowledge of human biology, will find the neuroscience described in this volume both challenging and rewarding as we did.

Gian Domenico Iannetti[1,2] and Enrico Alleva[3]
[1]*University College London (UCL), United Kingdom;*
[2]*Istituto Italiano di Tecnologia, Rome, Italy*
[3]*Istituto Superiore di Sanità, Rome, Italy*
*enrico.alleva@iss.it, giandomenico.iannetti@gmail.com*




**LA FUNZIONE DEL MONDO**
**Una storia di Vito Volterra**
Alessandro Bilotta, Dario Grillotti
Edizioni Consiglio Nazionale delle Ricerche
Feltrinelli Comics
Milano: Feltrinelli, 2020. 112 p.
ISBN 9788807550676.
€ 16.00.

*[The world's function: a biography of Vito Volterra]*

It is uncommon for a book to disseminate scientific knowledge exploiting the *graphic novel* technique, at least in Italy. Alessandro Bilotta and Dario Grillotti succeeded in doing so with *La funzione del mondo: una storia di Vito Volterra*. The book was an initiative by Consiglio Nazionale delle Ricerche (CNR, Italian National Research Council), promoted by Roberto Natalini, Director of the CNR's Institute for Calculus Applications.

Thanks to the comic strips' expressive versatility, the authors convey information in an easily accessible way. Therefore, the contents are appealing not only to a young audience but also to the large share of the public rather unfamiliar with maths.

The book is about Vito Volterra's life and work but, most importantly, his original and celebrated vision. Volterra was a mathematician who became Senator at the age of 45. During his lifetime, he was appointed President of the Accademia dei Lincei – a most prestigious Italian scientific institution – and served as CNR's founder and first President. Volterra was also listed by historians as one among the twelve Italian university professors – out of a total of one thousand two hundred – who refused to take the (then compulsory) oath of allegiance to Fascism.

The book's main merit is having lifted out of oblivion such an outstanding Italian figure, with his scientific profile and moral calibre. Indeed, up to now, Volterra has likely been much more celebrated abroad than in his own country.

From a pop-science standpoint, the book is flawless. Volterra's mathematic theories are explained in simple and readily understandable terms. To our judgment, this is a crucial goal, especially in times like ours, where the demand for scientific information is met with a kind of supply that often confuses, rather than inform, the general audience.

The book covers the main stages of Volterra's life, from his childhood in Ancona (Central Italy), growing up in a Jewish family who cultivated and encouraged his talent, to the dialogues as a student with Ulisse Dini and Enrico Betti (mathematicians from the University of Pisa); from the scholarly life and trips abroad, to the exchanges with prominent mathematicians, like Poincaré; from the marriage with Virginia Almagià, to his adult years, with the refusal to abide by Fascist rules. The authors also depict the elegant and sober social environment surrounding the intellectual elite of his era.

Vito Volterra was a mathematician who contributed in an original and in-depth way to various theories. He adopted a modern perspective in unifying what we would now characterize as "pure research", with its applied counterpart. As a politician, he insisted that the Italian Public School system should consider scientific development as a legislative priority.

The book's central part features the Commencement Address from the Academic Year 1901-1902, University "La Sapienza" in Rome. In this somehow historical speech, Volterra emphazised, with an incredibly modern vision, the uniqueness of mathematics as a scientific tool. Mathematics – he argued – is the key to solving many of the Universe's dark mysteries. Its symbols can synthesize and, to a certain extent, summarize the results reached by different sciences. Therefore, Volterra was a fierce advocate for a unified, rather than compartmentalized, approach to knowledge.

The volume's conclusion presents the famous "predator-prey" theory, which Volterra developed by observing fish behavior. That theory is a milestone in population dynamics, from which many models of real-life phenomena were drawn, encompassing seemingly unrelated fields, ranging from economics, to finance, to weather forecasting, to epidemiology.

The Covid-19 pandemic has underscored the importance and novelty of yet another theory, known as the Volterra-Lotka equation. The equation was named after Volterra himself and a fellow Austro-Ungaric mathematician, Alfred J. Lotka, who rather simultaneously

studied the same problem. The scientific study of the transmission dynamics of a virus in a population during an epidemic, and the framework behind the chaotic scenario defined by the World Health Organization (WHO) as "infodemic" are based in part on some of Volterra's mathematical intuitions. In a chapter about "Fish", the authors beautifully outline the complex system of non-linear differential equations governing the theory in a catchy and intuitive fashion.

Eighty years after Volterra's death, the mathematical tools he described in that early-19th century speech are still used to study Covid-19's transmission potential and map its spread. Vito Volterra's greatness must be acknowledged, and the memory of both his genius and his lasting civil service must be kept for future generations. The graphic novel technique can help start a promising path towards disseminating scientific contents out of their sometimes narrow boundaries.

Antonio Mistretta
*Istituto Superiore di Sanità, Rome, Italy*
*antonio.mistretta@iss.it*