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Cicurel R, Nicolelis M. The relativistic brain: how it works and why it cannot be simulated by a Turing machine. São Paulo: Kios Press, 2015.

Ronald Cicurel (June 3, 1945, Cairo) is a mathematician, philosopher, and writer known for being one of the founders of the Blue Brain project. This project aimed to create a synthetic brain using reverse engineering. Ronald has been a professor at the EPFL IT laboratory since 2006 and the coordinator of the International Institute of Neurosciences in Natal, Brazil, since 2010.

Miguel Angelo Laporta Nicolelis (March 7, 1961, São Paulo) is a Brazilian scientist and physician, noted as one of the top twenty scientists in his field of research by Scientific American. He is the first native Brazilian to have an article published on the cover of Science, one of the main journals in general science. Furthermore, the scientist is an emeritus professor at Duke University (Durham, USA) and studies organs, systems, and their interactions. His area of activity throughout his career, which initially was to understand a "brain code", is connecting the functions of the human brain to electronic machinery. Nicolelis and his allied researchers were responsible for developing a system that allows the formatting of robotic artifacts controlled by the brain, including in several areas of the globe at the same time, through what the neuroscientist called "Brainet", a cerebral translation that connects the actions of peers in decision making.

The monograph brings concepts from previous books by

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Cicurel and Nicolelis: “The Computer Will Not Digest The Brain” and “Much Beyond Our Self”, respectively. In this context, the authors highlighted that the language used will be understandable for laypeople of health academics because they need to understand the two theses presented in the monograph. Primarily, the reader is introduced to a new theory of the functioning of complex brains (i.e., those from Homo sapiens) called Relativistic Brain Theory (RCT) which is partially included in the title of the work. This theory is discussed in the first two chapters, being proposed as a modern neurophysiological model that focuses on explaining how the range of complex neural functions that integrate sensations, such as pain to the sense of conscious self, is generated by the immense networks of cells in the brain. While this impressive dynamic is discussed in the book, the monograph is interesting for professionals and other students in the health field because it exposes how these extensive neural networks can confer pathological mental states, creating a spectrum of neurological and psychiatric illnesses. The RCT requests extensive experimental investigations, which can be refuted or reaffirmed. According to the authors, the RCT offers a radical paradigm in understanding the brain of animals in general and human beings.

In addition to this theory, which brings a neuroscientific tool scope for understanding general neurological aspects, the work evidences its basic proposition: the series of postulates that refute the hypothesis, in English, of computationalism, which tries to relate complex brains to digital computers (i.e., Turing machines). Turing was a British mathematician considered the father of computational science and considered a Nazi code-breaking hero during the Second World War.

The propositions of computationalism became a source of inspiration for many science fiction and futurist works but were questioned by the concepts of Nicolelis. Both propose that complex nervous systems translate information using a dynamic one-component hybrid action (digital and analog). The analog part involves various neural electromagnetic fields, which cannot have their generation and repercussions considered computable (i.e., treated programmatically or mathematically), with any proposal to simulate the full complexity of the animal brain being limited in a Turing device or its derivative digital models.

In summary, the monograph is elegant, demonstrative, and accessible in language to the public, also bringing arguments that increase interest in the neurobiological field, which provided revolutionary experiments, such as Nicolelis’ brain-machine interface and character investigations of Cicurel mathematician. The authors explain that they do not intend to reduce the impact of Turing machines and artificial intelligence as promoters of human progress. However, they reinforce the appreciation of the brain at the level of a complex evolutionary block that will be far from reproduced by sophisticated and electronic machine versions.