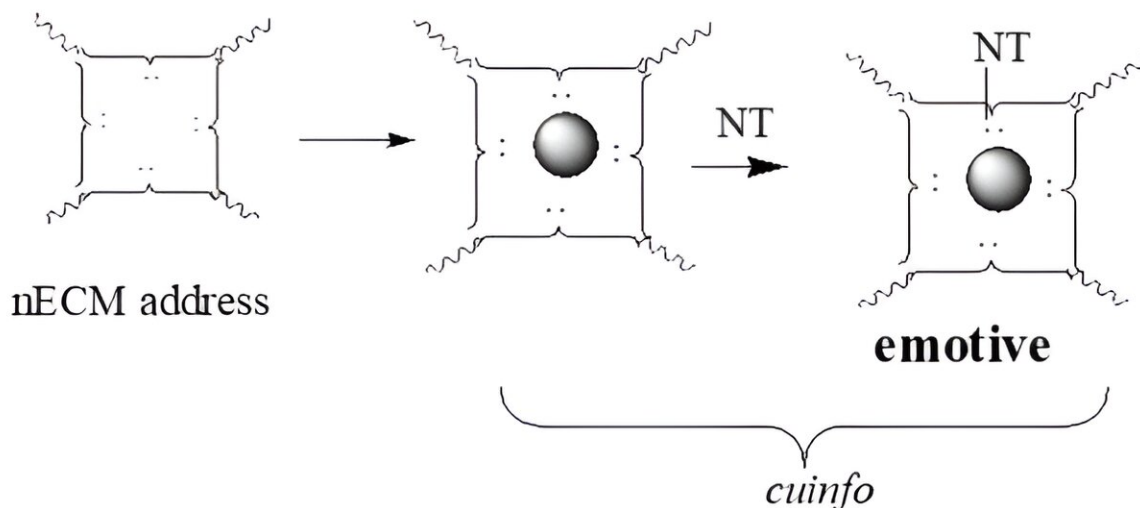


# Researchers challenge Connectome Projects and unveil new mechanisms of mentality

September 2 2024



Tripartite chemographic representations of cognitive units of information (cuinfo) by which neural memory is stored and reconstructed. Credit: *International Journal of Psychiatry Research* (2024).

<https://www.scivisionpub.com/pdfs/connectome-projects-and-mentality-3433.pdf>

In a newly published critique of the Connectome Projects, Dr. Gerard Marx from MX Biotech and Prof. Chaim Gilon from Hebrew University offer fresh perspectives on the intricate structures of the brain that have long been overlooked.

Their latest work, published in the *International Journal of Psychiatry Research*, addresses significant gaps in our understanding of neural connectivity and cognitive function, providing new insights into how mental states are encoded in the [brain](#).

The Connectome Projects, a series of ambitious scientific initiatives, aimed to elucidate the brain's neural ultrastructure across various species, including *C. elegans*, mice, and humans. The projects sought to achieve the following objectives:

- Unravel the synaptic-scale organization of the brain.
- Chart the circuits that coordinate the brain's many functions.
- Understand fundamental cognitive operations.

However, Dr. Marx and Prof. Gilon emphasize that these projects, along with a subsequent review by Eisenstein, have significantly neglected a critical element of neural architecture—the neural extracellular matrix hydrogel (nECM/PNN). Earlier studies have shown, using various staining methods such as [electron microscopy](#) (TEM, SEM), and [mass spectrometry](#), that neurons are never entirely "naked" but are instead surrounded by the nECM/PNN.

In their critique, Dr. Marx and Prof. Gilon argue that the Connectome groups and Eisenstein's review failed to incorporate the significance of the nECM/PNN into their evaluations of neural connectivity and [cognitive processes](#).

They propose a novel tripartite mechanism of neural memory based on biochemical interactions, where cognitive units of information (cuinfo) are realized as metal-centered complexes within the nECM/PNN. This mechanism enables the encoding of emotive states through the complexation of neurotransmitters (NTs) released by neurons and glial cells.

Dr. Marx and Prof. Gilon's critique underscores a fundamental myopia in the Connectome Projects' approach, suggesting that the focus on traditional neural structures has hindered the development of a comprehensive model of brain mentality.

As they note, "The more we know about structure, the harder it is to turn this into an easy-to-understand model." This acknowledgment of the complexity of brain structure opens new avenues for research and underscores the need for a more holistic understanding of neural connectivity.

Their work not only challenges prevailing models but also paves the way for future research that integrates the crucial role of the nECM/PNN in understanding brain function and mental processes.

**More information:** Gerard Marx and Chaim Gilon, Connectome Projects and Mentality, *International Journal of Psychiatry Research* (2024). [www.scivisionpub.com/pdfs/conn ... d-mentality-3433.pdf](http://www.scivisionpub.com/pdfs/conn...d-mentality-3433.pdf)

Provided by Hebrew University of Jerusalem

Citation: Researchers challenge Connectome Projects and unveil new mechanisms of mentality (2024, September 2) retrieved 8 September 2024 from <https://medicalxpress.com/news/2024-09-connectome-unveil-mechanisms-mentality.html>

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