

Review of: "Network Neuroscience and Translational Medicine for Understanding Mental Health: The example of Post-traumatic Stress Disorder"

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Potential competing interests: No competing interests

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The paper 'Network Neuroscience and Translational Medicine for Understanding Mental Health: The Example of Posttraumatic Stress Disorder' can be understood in terms of the history of a long-standing problem: how to explain mental illness. Medical science made substantial advances in the 19th century using the now widely accepted concept of disease. Diseases are defined by a specific pathophysiology. Diseases are caused by specific abnormalities in anatomy, tissue, cells or subcellular structure. Diseases are modular – they occur in specific parts of the body. Towards the end of the 19th century, the specific pathophysiology of most diseases had been discovered with the exception of a class of diseases known as nervous diseases. Charcot believed he had discovered abnormality in the nerves of those with nervous diseases, but this was found to be incorrect, and Freud, who had worked with Charcot, subsequently suggested an alternative psychological explanation for what then became known as mental illness. The term mental illness continued to be used even after the first anti-psychotic drugs were discovered by accident in the 1950s and the search returned to the biological basis of mental illness/nervous disease. This search has not been overly successful. The serotonergic hypothesis is now disputed [1], and not only because depression is common despite the widespread use of antidepressants.

This paper provides yet another way of investigating the physiology of mental illness based on neurological networks.

This paper shows that mental illness cannot be mapped onto specific parts of the brain. It has the properties of a connectionist system rather than the modular system. The question this raises is, to what extent is network analysis useful for understanding mental illness? The unity of science hypothesis [2] takes various forms but (in essence) suggests that sciences occur at different levels (sociology, psychology, biology, chemistry, physics), and although there may be a logical relation between levels, the existence of emergent properties means that a higher level cannot be entirely understood in terms of a lower level, even though a lower level may be useful in understanding a higher level. Mental illness must be caused by physiology. However, physiology is the result of chemistry which is the result of fundamental particles spinning in space. So mental illness is caused by fundamental particles spinning in space, but physics is not useful for

understanding mental illness.

The question is what can network neurology contribute in contrast to psychology? I think this paper does illustrate one possibility. Connectivity is the property of a network as a whole. A review of biomarker network connectivity and stress [3] shows a relationship between high connectivity and Selye's stage of adaptation and low connectivity and Selye's stage of stress exhaustion. Is there a relationship between biomarker networks and neural networks? I would be interested if the author could comment. Furthermore, what is the relationship between symptom networks and biological networks? Although symptoms may cause other symptoms, symptoms must have a biological basis. Even if there is no firm evidence, I would be interested in the opinions of others on the relationship between biomarker networks, neurological networks and symptom networks. Symptom networks are an emergent property of biology, but what is the relationship between networks at these different levels? I am curious to find out.

References

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