

Preface

More than three centuries ago, Rene Descartes looked for “the seat of the soul” within the brain that could integrate *res cogitans*, representing the inner world, with *res extensa* – the outside world. Descartes thought that this special place is involved in sensation, imagination, memory, and the causation of bodily movements, and described the mind as an extracorporeal entity. In this theoretical concept Descartes intuitively anticipated the so-called binding problem of consciousness, which means that there is a part of the nervous system that integrates and transforms neural activity into reportable subjective experiences in the hypothetical center later called the Cartesian theater.

In agreement with this Cartesian concept there is evidence that certain parts of the brain are more essential for consciousness than others and may represent local integrative centers. On the other hand, there is a conceptual approach to consciousness that suggests that consciousness (instead of a single central place – “Cartesian theater”) might be related to the binding of various events represented by groups of synchronized excited neurons that are located at different parts of the brain without unifying spatial convergence. This neural activity occurs synchronously across brain regions and likely underlies the integration of diverse brain activities. Together these findings indicate that a solution of the binding problem might reside within the fundamental problem of consciousness in modern neuroscience.

The subtitle of the well-known book *The Astonishing Hypothesis* and *The Scientific Search for the Soul*. In this book, Crick argued that the traditional Cartesian concept of the soul as a nonmaterial being must be replaced by a scientific understanding of how the brain produces the mind. Although this problem is still unresolved, there is a predominant opinion that consciousness emerges from a dynamical nucleus of persisting reverberation and interactions of neural groups. Other approaches to the binding problem also include non-conventional hypotheses related to various physical theories, such as complexity and chaos theory, quantum physics, and the theory of relativity.

Although we do not know how the nervous system integrates distributed neural activities and creates subjective experience, there is evidence that disturbed neural

interactions producing patterns of temporal disorganization, decreased functional connectivity and global distribution of information, may influence the mind. Additionally, there is evidence that deficits in functional connectivity and distribution of information may underlie specific perceptual and cognitive states related to the disintegration of consciousness that may occur in various neuropsychiatric disorders.

On the other hand, disturbances in neural synchronization and coherence likely present a basis for discrete mental states that through differences between them enable recognition and awareness of the external and internal world. This form of internal disunity of the brain likely presents basic code that defines relative differences and enables their recognition in mental and physical space. Through this process specific observers may define reality and create observer-specific neurogeometry of the space and time.

To the basic assumption that causal connections exist between the brain and mind, recent neuroscientific evidence has added another – that the mental state may significantly influence the brain and body on various functional levels. In addition, this interaction between mind and brain enables the laws of nature to be discovered and the external world to be understood, likely through the rules that integrate the basic nature of the mind and the physical world. Because we can compare all differences only with respect to the unity, there is something in us that is immutable; as C.G. Jung said: “They are only an illusion, time and space, and so in a certain part of our psyche time does not exist at all.” This unknown likely enables that we want to know.

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