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Brain Connectome of Glia, Axons, and Neurons: Cognitive Model of Analogy

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Abstract : An analogy is an essential tool of human cognition that enables connecting diffuse and diverse systems with physical, behavioral, principal relations that are essential to learning, discovery, and innovation. The Cognitive Model of Analogy (CMA) leads and creates patterns of pathways to transfer information within and between domains in science, just as happens in the brain. The connectome of the brain shows how the brain operates with mental leaps between domains and mental hops within domains and the way how analogical reasoning mechanism operates. This paper demonstrates the CMA as an evolutionary approach to science, technology, and life. The model puts forward the challenges of deep uncertainty about the future, emphasizing the need for flexibility of the system in order to enable reasoning methodology to adapt to changing conditions in the new era, especially post-pandemic. In this paper, we will reveal how to draw an analogy to scientific research to discover new systems that reveal the fractal schema of analogical reasoning within and between the systems like within and between the brain regions. Distinct phases of the problem-solving processes are divided thusly: stimulus, encoding, mapping, inference, and response. Based on the brain research so far, the system is revealed to be relevant to brain activation considering each of these phases with an emphasis on achieving a better visualization of the brain's mechanism in macro context; brain and spinal cord, and micro context: glia and neurons, relative to matching conditions of analogical reasoning and relational information, encoding, mapping, inference and response processes, and verification of perceptual responses in four-term analogical reasoning. Finally, we will relate all these terminologies with these mental leaps, mental maps, mental hops, and mental loops to make the mental model of CMA clear.

Keywords : analogy, analogical reasoning, brain connectome, cognitive model, neurons and glia, mental leaps, mental hops, mental loops
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