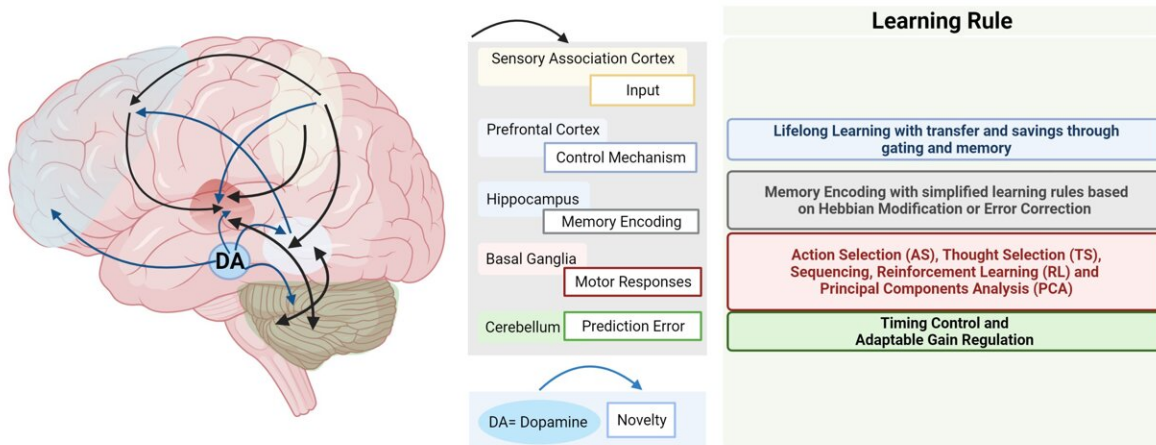# A neurobiological model to better understand creative processes

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Proposed neural network model architecture and learning rules to simulate creative processes based on novelty, including DT, abstraction, and improvisation. Credit: Jacobs University

"Many believe that creativity is assigned to a single brain region. But that is not the case," says Radwa Khalil. Together with scientists from South Africa and Australia, the neurobiologist at Jacobs University Bremen has

proposed a computer-based model that assigns creative processes to neural networks in the brain. Depending on the type of creative activity, these networks can be designed differently. The research results have recently been published in the journal *Neuroscience & Biobehavioral Reviews*.

Creativity is understood as the creation of novel, useful and surprising solutions. The researchers argue that the associated cognitive processes, such as the ability to abstract, improvise, or think divergently, involve different brain areas that are interconnected. These areas include the cerebellum, hippocampus, prefrontal cortex, and basal ganglia. Different areas are activated depending on the type of creativity. The similarities and differences between these types of creativity and their neuronal circuits are described by the model with the help of algorithms. Dopamine plays an essential role as a critical modulator for controlling and optimizing creative neural pathways.

With this proposed neural network model, the scientists, for the first time, provide a unified framework for seemingly three different forms of creativity. "With this starting point, we hope to thoroughly contribute to a better understanding of the underlying neuronal mechanisms," said Khalil. "The more we know about these mechanisms, the more specifically we can promote creativity and possibly contribute as promising interventions for people with relevant disturbed brain areas."

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