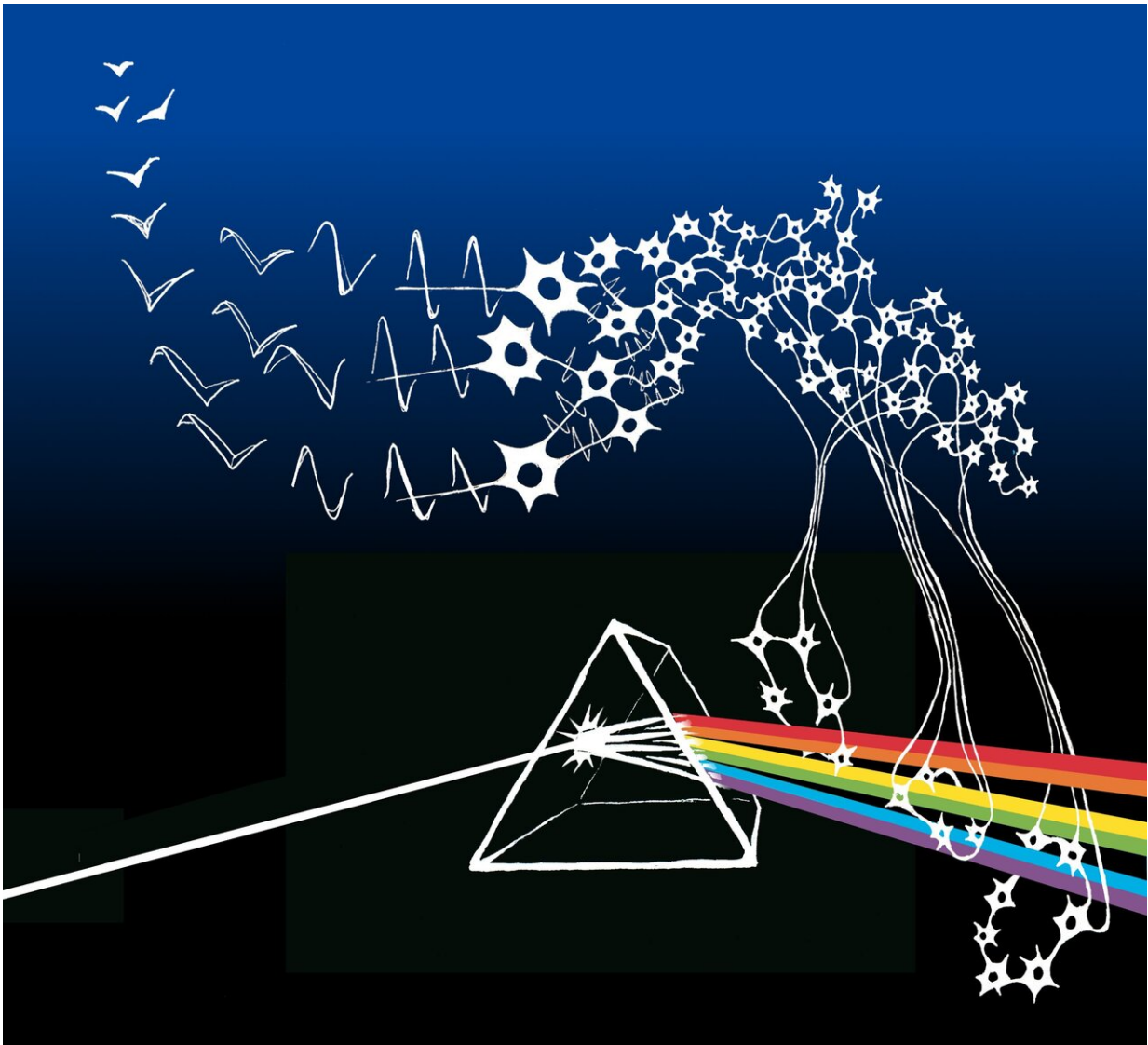


Flexibility of working memory from random connections

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Stimuli from our sensory world are processed separately through the prism of structured, ring-like, sensory networks in the brain. According to the new model

of working memory from Princeton University's Flora Bouchacourt and Tim Buschman, these representations randomly project to higher cortical areas, where they are flexibly combined. This flexible workspace permits us to create higher cognitive thoughts, like birds flying through the sky. Credit: Princeton University

A new article in *Neuron* from Princeton University neuroscientists Flora Bouchacourt and Tim Buschman presents a new model of working memory.

Working memory is your ability to hold things 'in mind.' It acts as a workspace in which information can be held, manipulated, and then used to guide behavior. In this way, it plays a critical role in cognition, decoupling behavior from the immediate sensory world. One of the remarkable things about working memory is its [flexibility](#)—you can hold anything in mind. How this flexibility is achieved has not been understood. In their new manuscript, Bouchacourt and Buschman present a [new model](#) of working memory that captures this flexibility.

The [model](#) combines a high-dimensional random network with structured sensory networks to flexibly maintain any input. The untuned nature of the connections allows the network to maintain any arbitrary input.

However, this flexibility comes at a cost: the random connections overlap, leading to interference between representations and limiting the memory capacity of the network. This matches the limited capacity of working memory in humans and suggests there is a tradeoff between flexibility and capacity in working memory.

In addition, the model captures several other behavioral and

neurophysiological characteristics of working memory.

This work provides new insight into a core cognitive function in humans. Ongoing work hopes to understand how these mechanisms may be disrupted in neuropsychiatric diseases that disrupt working [memory](#).

More information: Flora Bouchacourt et al, A Flexible Model of Working Memory, *Neuron* (2019). [DOI: 10.1016/j.neuron.2019.04.020](https://doi.org/10.1016/j.neuron.2019.04.020)

Provided by Princeton University

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