



Talks by rising stars of neuroscience

**Meta-learning synaptic plasticity and memory addressing for
continual familiarity detection
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Over the course of a lifetime, we process a continual stream of information. Extracted from this stream, memories must be efficiently encoded and stored in an addressable manner for retrieval. To explore potential mechanisms, we consider a familiarity detection task where a subject reports whether an image has been previously encountered. We design a feedforward network endowed with synaptic plasticity and an addressing matrix, meta-learned to optimize familiarity detection over long intervals. We find that anti-Hebbian plasticity leads to better performance than Hebbian and replicates experimental results such as repetition suppression. A combinatorial addressing function emerges, selecting a unique neuron as an index into the synaptic memory matrix for storage or retrieval. Unlike previous models, this network operates continuously, and generalizes to intervals it has not been trained on. Our work suggests a biologically plausible mechanism for continual learning, and demonstrates an effective application of machine learning for neuroscience discovery.

Event link:

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