

Abstract Submitted
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Associative memory through rigid origami ARVIND MURUGAN, MICHAEL BRENNER, Harvard University — Mechanisms such as Miura Ori have proven useful in diverse contexts since they have only one degree of freedom that is easily controlled. We combine the theory of rigid origami and associative memory in frustrated neural networks to create structures that can “learn” multiple generic folding mechanisms and yet can be robustly controlled. We show that such rigid origami structures can “recall” a specific learned mechanism when induced by a physical impulse that only need resemble the desired mechanism (i.e. robust recall through association). Such associative memory in matter, seen before in self-assembly, arises due to a balance between local promiscuity (i.e., many local degrees of freedom) and global frustration which minimizes interference between different learned behaviors. Origami with associative memory can lead to a new class of deployable structures and kinetic architectures with multiple context-dependent behaviors.

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