Associative memory through self-assembly

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Self-assembly has recently emerged as a powerful technique for synthesizing structures on the nano- and micro-scale. The basis of this development is the use of biopolymers, like DNA, to design specific interactions between multiple species of components, allowing the spontaneous assembly of complex structures. Here we address a fundamental limitation of the existing approaches to self-assembly: Namely, every target structure must have its own dedicated set of components, which are programmed to assemble only that very structure. In contrast, in biological systems, the same set of components can assemble many different complexes. Inspired by this, we extend the self-assembly framework to mixtures of shared components capable of assembling distinct structures at will.