# Molecular Computational Simulation of Cognitive Processes for Anagram Solving

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**Abstract**

We use molecular computing for simulation of human information processing. We have chosen the problem of anagram which is a wordplay involving rearrangement of the given letters from a word or phrase into a new one. This wordplay apparently needs mental letter juggling and combinations, Human studies of anagram solving suggest that experts rely more on constraints of word structure, such as bigram frequency, than novices. Here we formulate the anagram solving as a stochastic constraint satisfaction process. We use DNA sequences to encode the letters and constraints and perform DNA hybridization in microtubes to simulate the constraint satisfaction process. Our simulation experiments show similar behaviors of human problem solving and support, for example, that the good anagram solvers tend to come up with solutions faster than novices who are likely to perform a serial hypothesis-testing process for a solution. Our work opens up the possibility that molecular computing can be a useful tool for computational modeling of cognitive processes.

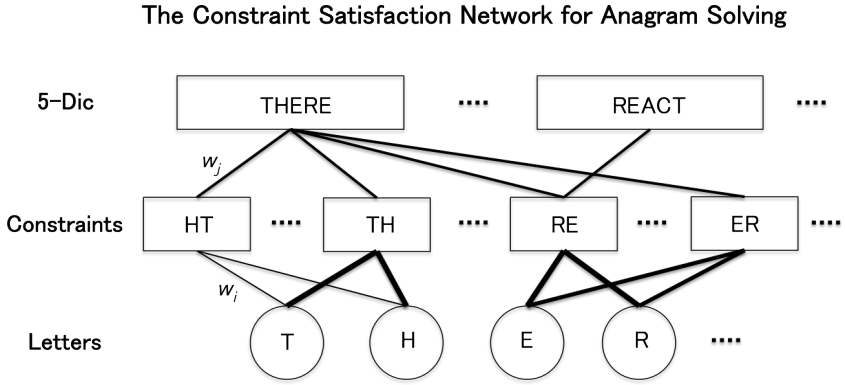


**Figure 1. A 3-layer constraint satisfaction network. The bottom layer consists of 26 letters in English alphabet. The weights ($w_i$, $w_j$) represent the constraints for the combinations of the letters. The feed-forward network represents the anagram solver's constraint satisfaction network.**

## Reference

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