Self-interacting random walks

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Take two 3-dimensional probability measures in three dimensions with mean 0. At each time we choose one of the measures based on the history of the process and take a step according to that measure. (For instance, we might use the first measure at a newly visited site, and the second measure at sites that have been visited before). Itai Benjamini (personal communication) asked if the resulting process must be transient, or could it be recurrent?

In this talk I will present the answer and sketch the proof. Perhaps surprisingly, the answer changes when we have 3 measures instead of 2. (Joint work with Yuval Peres and Serguei Popov)