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Review text:

The authors introduce so-called Naming Automata networks to model some features of the emergence of a vocabulary related with the Naming Game Model. The latter has been extensively studied as a solution of the problem of how a population can efficiently reach agreement on a linguistic convention.

Let $G = (V, E)$ be a connected and undirected graph with vertex set $V = \{1, \ldots, n\}$ and edge set E of size m. Let W be a finite set of words. Then a Naming Automata is defined as a tuple $A = (G, Q, (f_i : i \in V), \phi)$ where $Q = W \times \mathcal{P}(W)$ is the set of states, i.e. the state associated to a vertex i of the network is the pair (x_i, M_i) where $x_i \in W$ and $M_i \subseteq W$. The set M_i here represents the memory of vertex i, in which it stores words (synonyms). The vertex i only shows one word x_i to its neighbors, which is called the label word of i (or the word exhibited by i). The set Q^n is called the set of configurations. Further, every vertex has a local function $f_i : Q^{|V_i|} \to Q$ where $V_i = \{j \in V |\ (i, j) \in E\} \cup \{i\}$ is its neighborhood. The application of local functions f_i follows an updating scheme ϕ, that can be *synchronous*, where each site is updated at the same time; *sequential*, where vertices are updated one by one in a prescribed order (there being $n!$ different sequential updates), and *asynchronous* where vertices are updated one by one in an uniformly random order. All three updating schemes are considered for extremal and majority local functions f_i (respectively called Extremal and Majority Naming Automata) for which the authors study the dynamical behavior (attractors and convergence).

For Extremal Naming Automata the authors conclude that it suffices to consider different orders of words between the population to observe the emergence of a complex behavior: The population not only does not arrive to agree with a synonym but may change its choices following cycles with super-polynomial periods. For the Majority Naming Automata, although local majority clusters appear, the whole society does not necessarily converge to a unique synonym.

Reviewed by Vladimir García-Morales