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Stochastic Dynamics of Lexicon Learning in an Uncertain and Nonuniform World RICHARD BLYTHE, University of Edinburgh, RAINER REISENAUER, Technische Universität München, KENNY SMITH, University of Edinburgh — We study the time taken by a language learner to correctly identify the meaning of all words in a lexicon under conditions where many plausible meanings can be inferred whenever a word is uttered. We show that the most basic form of cross-situational learning - whereby information from multiple episodes is combined to eliminate incorrect meanings - can perform badly when words are learned independently and meanings are drawn from a nonuniform distribution. If learners further assume that no two words share a common meaning, we find a phase transition between a maximally efficient learning regime, where the learning time is reduced to the shortest it can possibly be, and a partially efficient regime where incorrect candidate meanings for words persist at late times. We obtain exact results for the word-learning process through an equivalence to a statistical mechanical problem of enumerating loops in the space of word-meaning mappings.

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