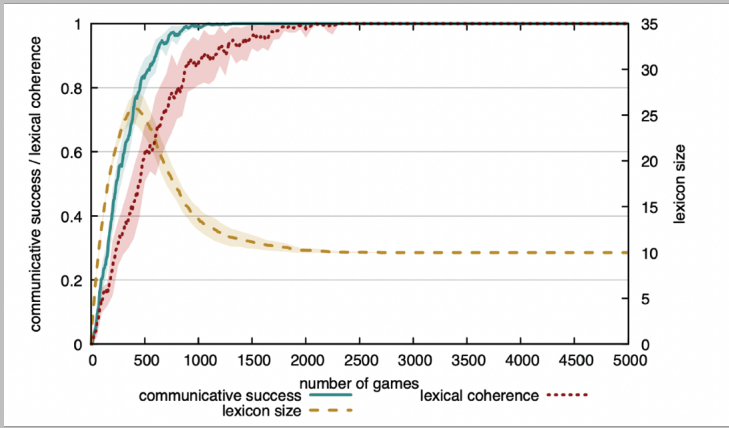
The Naming Game

Practical session 1

Goal of this practical session

During this practical session, you will implement your own naming game experiment. A successful implementation should capture the expected dynamics of agent-based models of emergent communication (in terms of communicative success, lexical coherence and average lexicon size):



This document provides some steps to guide you through the implementation. Once you have a working implementation of the naming game running, you can play around with different experiment configurations, allowing you to better understand the resulting evolutionary dynamics. For the implementation, we advise you to use Python. For a detailed description of the naming game, you can consult the following paper:

> Paul Van Eecke, Katrien Beuls, Jérôme Botoko Ekila, Roxana Rădulescu, Language games meet multi-agent reinforcement learning: A case study for the naming game, *Journal of Language Evolution*, Volume 7, Issue 2, July 2022, Pages 213–223, https://doi.org/10.1093/jole/lzad001

Guiding steps

1. Start by initializing the world, population, vocabulary, and the experiment.
2. Implement the interaction script of the naming game.
3. Run a series of 5000 interactions (10 agents and 5 objects) and inspect the results. Visualize the results by plotting communicative success, lexical coherence, and lexicon size in function of the number of games played.

Guiding questions

- How do the evolutionary dynamics change when;
  - increasing the population size to 100 agents?
  - decreasing the population size to 2 agents?
  - increasing the world size to 100 objects?
  - omitting alignment (i.e. the agents do not reward or punish vocabulary items after an interaction)?

Report

Write a small report (max. 1 page, pdf format) in which you detail your findings. An assignment section was created on Webcampus/Canvas where you can upload the pdf and the code. The report is due on Sunday 19/10/2025 at 23:59.