Internship, 4 to 6 months

Experimenting how humans actively negotiate new linguistic conventions

Flowers Project-team, Inria Bordeaux Sud-Ouest
william.schueller@inria.fr, pierre-yves.oudeyer@inria.fr

Description

How do humans agree and negotiate linguistic conventions? This question is at the root of the domain of experimental semiotics [3], which will be the context of this internship. Typically, the experiments of this field consist in making human subjects play a game where they have to learn how to interact/collaborate through a new unknown communication medium (such as abstract symbols). In recent years, such experiments allowed to see how new conventions could be formed and evolve in population of individuals, shading light on the origins and evolution of languages [4, 2].

The rules of these interactions are derived from a class of computational models of language formation within a population of communicating agents, the Language Games [9, 4, 5]. We work especially with a simple version of those models, called the Naming Game [10, 5], and focus on the influence of active learning/teaching mechanisms on the global dynamics [6, 7, 8].

In this internship, the goal will be to design, implement and conduct an experiment with humans, in the form of a Naming Game. Participants will interact through the mediation of a controlled communication system (through a website), to study whether or not they use active learning/teaching strategies to negotiate new linguistic conventions. The experimental setup will be implemented on a crowd-sourcing platform or alternatively as a tablet-based game.

Similar experiments have been conducted in previous work to study the agreement dynamics on a name for a single picture [1]. Our goal here is to make several pictures or interaction topics available, and quantify the extent to which participants actively control the complexity of their interactions.

A first draft of the experiment is already implemented:
`https://github.com/wschuell/ng_userxp`
And can be played here:
`http://naming-game.bordeaux.inria.fr`

Required skills

- Design of experimental protocols with human-computer interfaces
- Interface design (which information is presented to the user and how)
- Statistical analysis (choose relevant measures)
- Programming in scripting languages (Python, Javascript, ...)
- Experience with crowd-sourcing platforms would be an advantage

Location and supervision

This internship will be located in the Flowers team at Inria Bordeaux Sud-Ouest (`https://flowers.inria.fr`). The Flowers team studies the developmental mechanisms that allow organisms to develop sensorimotor, social and linguistic skills in a lifelong manner, following an interdisciplanry approach at the cross-roads of artificial intelligence, cognitive science and neuroscience. In particular, the team focuses on the modelling of curiosity-driven learning in sensorimotor and language development.

The internship will be supervised by William Schueller and Pierre-Yves Oudeyer. To apply, send an email to `william.schueller@inria.fr` and `pierre-yves.oudeyer@inria.fr`.

References

[1] Damon Centola and Andrea Baronchelli. The spontaneous emergence of conventions: An experimental study of cultural evolution. *Proceedings of the National Academy of Sciences*, 112(7):1989–1994, 2015.

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[3] Bruno Galantucci and Simon Garrod. Experimental semiotics: a review. *Frontiers in human neuroscience*, 5:11, 2011.

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[5] Vittorio Loreto, Andrea Baronchelli, Animesh Mukherjee, Andrea Puglisi, and Francesca Tria. Statistical physics of language dynamics, 2011.

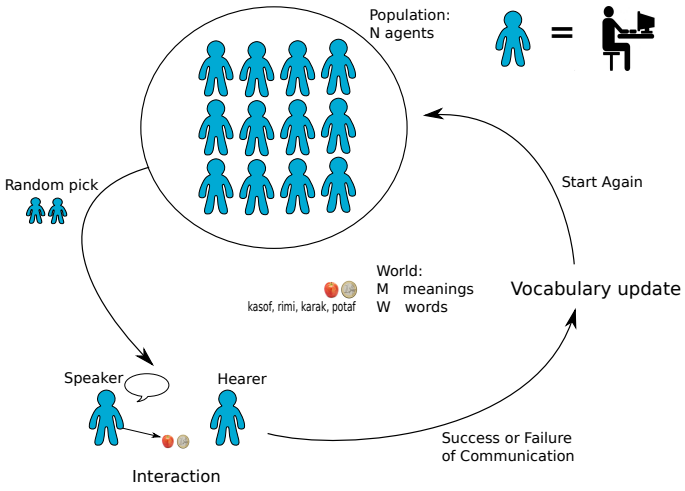
[6] Pierre-Yves Oudeyer and Frédéric Delaunay. Developmental exploration in the cultural evolution of lexical conventions. In *proceedings of the 8th international conference on epigenetic robotics : modeling cognitive development in robotic systems*, 2008.

[7] William Schueller and Pierre-Yves Oudeyer. Active Learning Strategies and Active Control of Complexity Growth in Naming Games. In *proceedings of the 5th International Conference on Development and Learning and on Epigenetic Robotics*, pages 220–227, 2015.

[8] William Schueller and Pierre-Yves Oudeyer. Active control of complexity growth in naming games: Hearer's choice. In *The Evolution of Language: Proceedings of the 11th International Conference (EVOLANGX11)*, 2016.

[9] Luc Steels. Language games for autonomous robots. *Intelligent Systems, IEEE*, 16(5):16–22, 2001.

[10] Pieter Wellens. Adaptive Strategies in the Emergence of Lexical Systems, 2012.



The Naming Game:
Evolution towards a global pattern (shared lexicon)
through repeated local interactions

(a) Example of a game with the interface already existing. Play it here: `http://naming-game.bordeaux.inria.fr`