

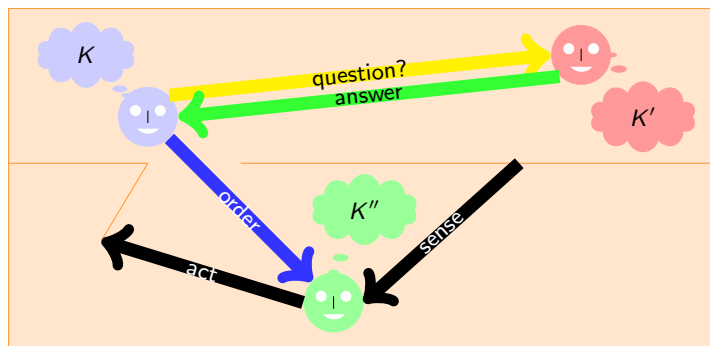
# Interaction-based knowledge evolution

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- ▶ Small team (three permanent researchers);
- ▶ LIG team common to INRIA and UGA;
- ▶ Worldwide reputation on **ontology matching**
- ▶ Two axis:
  - ▶ Link key based data interlinking
  - ▶ **Cultural knowledge evolution**

## Context



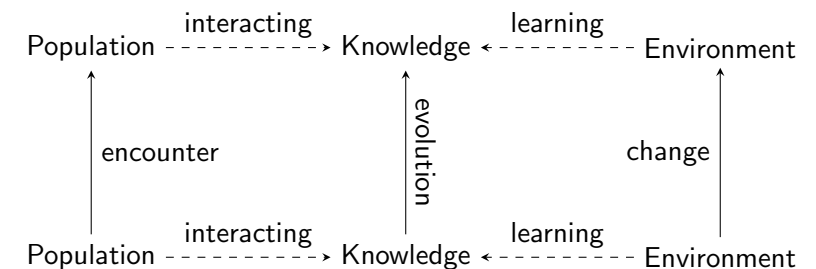
Fact: knowledge is heterogeneous

Problem: How does this knowledge evolve, especially when:

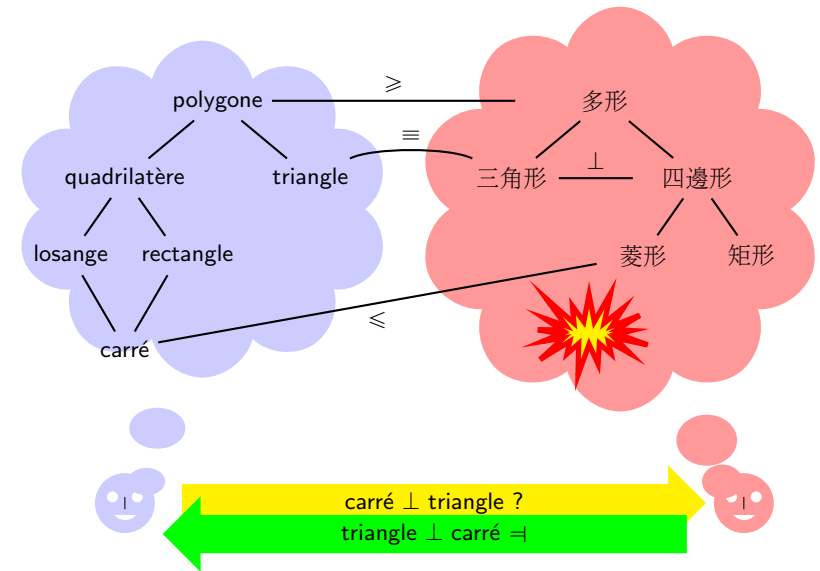
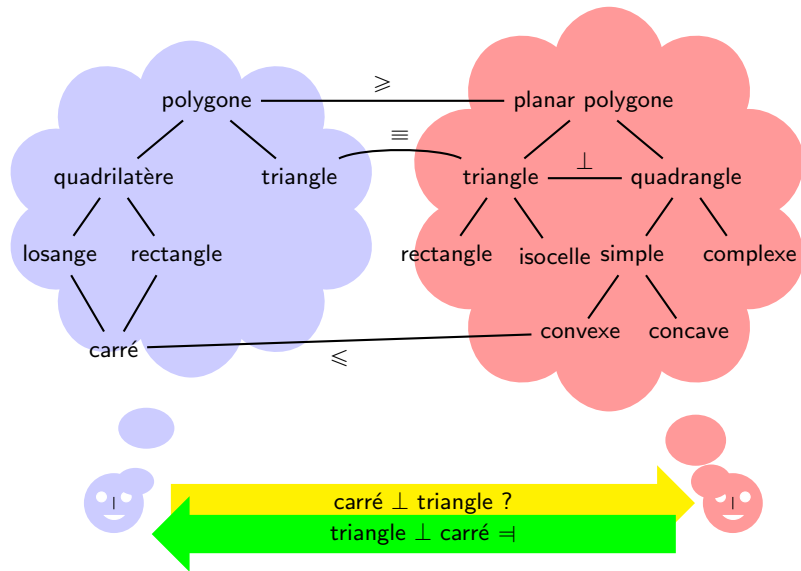
- ▶ new agents come into play
- ▶ the environment changes

## General objective

Study mechanisms by which knowledge can evolve through local adaptation to changing environment and society



What are the properties of the knowledge obtained in different situation?



- ▶ Natural evolution (Darwin): variation-selection-transmission;
- ▶ Cultural evolution (Cavalli Sforza, Richerson): applied to culture (knowhow, society structure, language)
- ▶ Experimental cultural language evolution (Axelrod, Steels): multi-agent simulation

⇒ Cultural knowledge evolution: applied to knowledge

Adaptation:

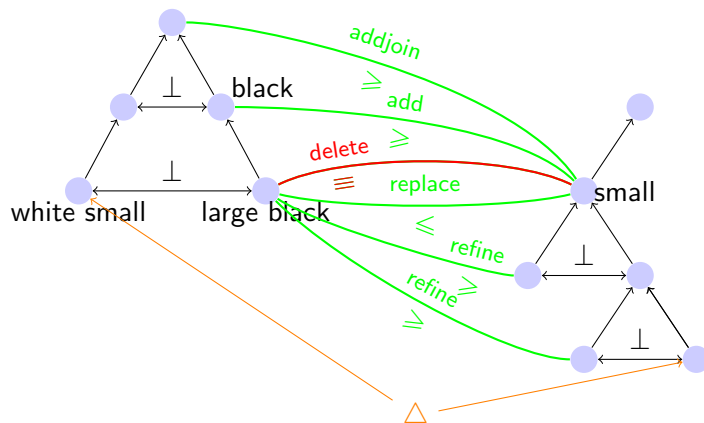
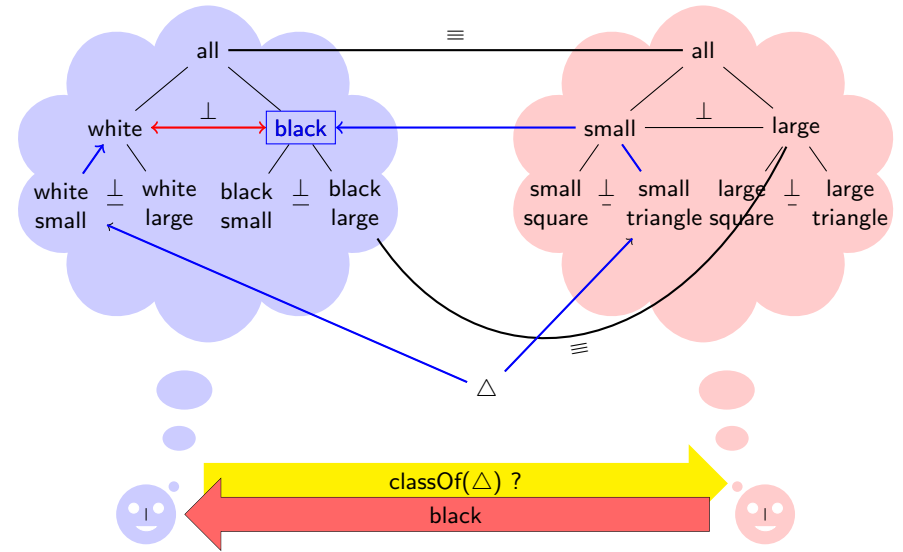
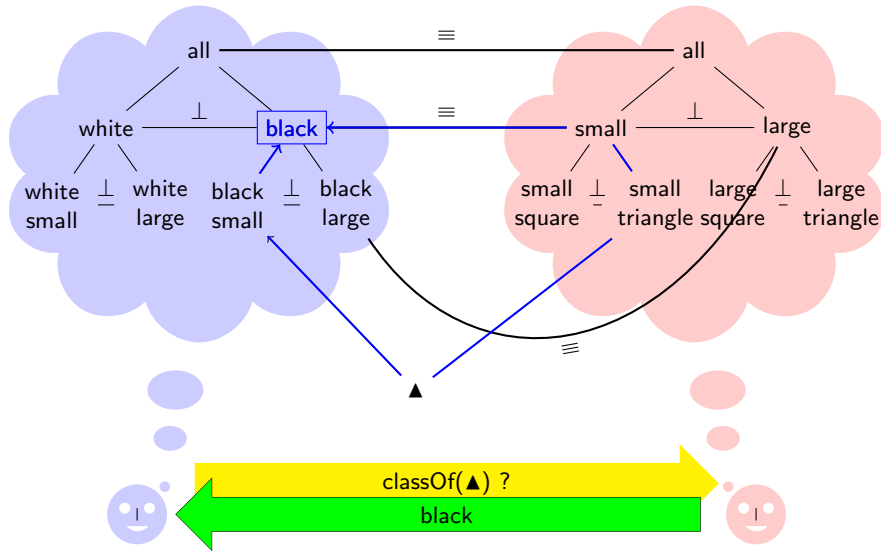
- ▶ How do agent populations adapt their knowledge representation to their environment and to other populations?

Evolution:

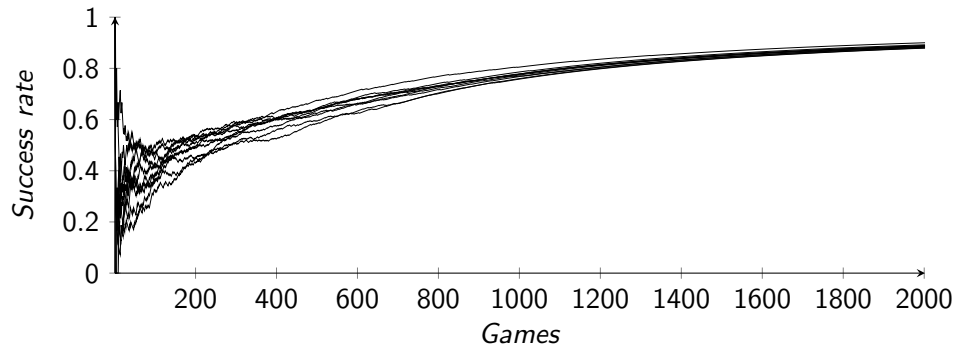
- ▶ How must this knowledge evolve when the environment changes and new populations are encountered?
- ▶ To what extent the environment and society constrain (formal) knowledge representation?

Diversity:

- ▶ How can agents preserve knowledge diversity and is this diversity beneficial?



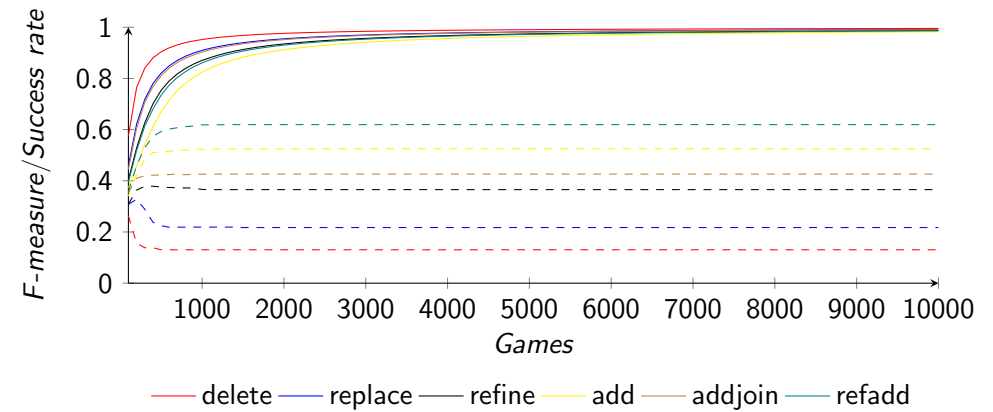
1. Does the process converge?
2. How different adaptation operators compare?
3. How do they compare to baselines?
4. Can operators improve away from the initial situation?
5. Can this start from scratch?



operator=add; #agents=4; #games=2000; #runs=1

Operator	Size	Success rate	Inc. degree	Sem. Precision	Sem. F-measure	Sem. Recall	Conv.
reference	86	1.0	0.0	1.0	1.0	1.0	1
initial	54	0.24	0.34	0.11	0.20	0.89	-
delete	6	0.99	0.0	1.0	0.13	0.07	445
replace	11	0.99	0.01	0.99	0.21	0.12	1478
add	33	0.98	0.14	0.80	0.52	0.39	1396
refine	20	0.99	0.02	0.96	0.37	0.23	1133
addjoin	23	0.99	0.10	0.84	0.43	0.29	1004
refadd	41	0.99	0.09	0.86	0.62	0.48	1266
Alcomo	28	0.43	0.0	0.21	0.26	0.33	-
LogMap	29	0.51	0.0	0.24	0.26	0.29	-

operator=del,repl,add,addjoin,refine,refadd; #agents=4; #games=10000; #runs=10



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1. Altering ontologies
2. Learning ontologies and alignments
3. Involving several populations
4. Modifying the environment
5. Maintaining several representations
6. Using different selective pressure
7. Playing games with heterogeneous agents
8. ...

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