

Transmission de connaissances et sélection

Yasser Bourahla, Manuel Atencia and Jérôme Euzenat

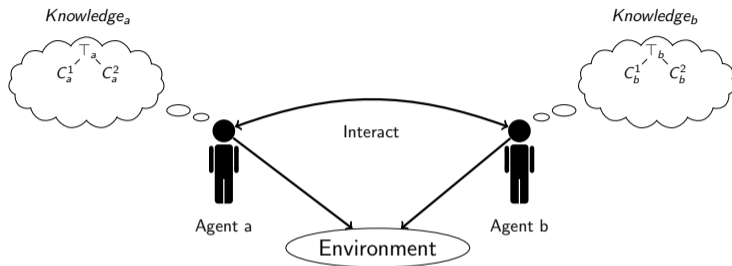
The logo for Inria, featuring the word "Inria" in a red, cursive script.The logo for Université Grenoble Alpes (UGA), featuring the letters "UGA" in blue with a red triangle above the "A", and the text "Université Grenoble Alpes" below it.

28/06/2022

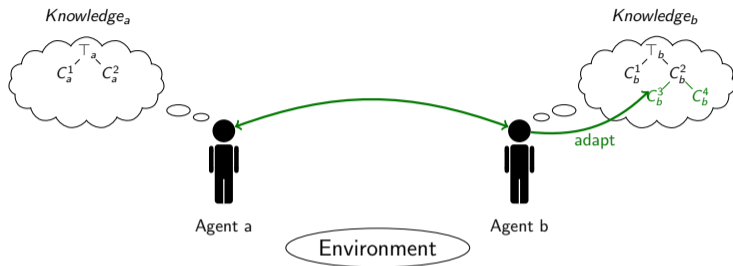
Question



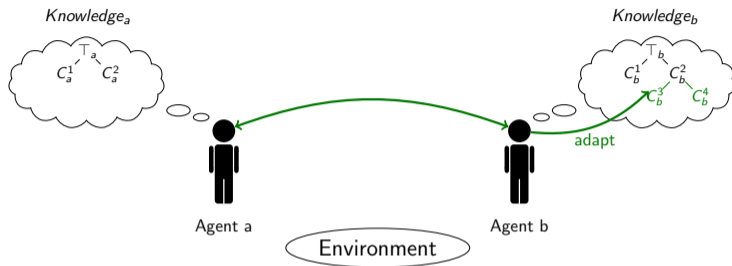
Question



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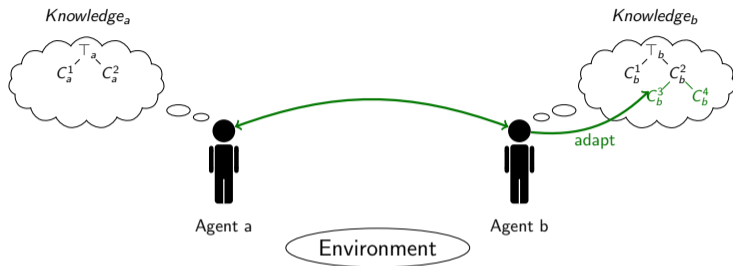
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Knowledge can evolve as it goes through:

- Variation.
- Selection.
- Transmission (inter-generation and intra-generation).

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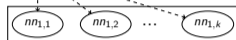
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roles of inter-generation and intra-generation transmissions?

Existing Work

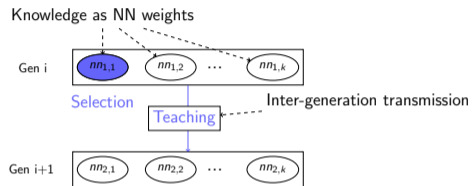
Acerbi and Parisi, JASSS 2006

Knowledge as NN weights



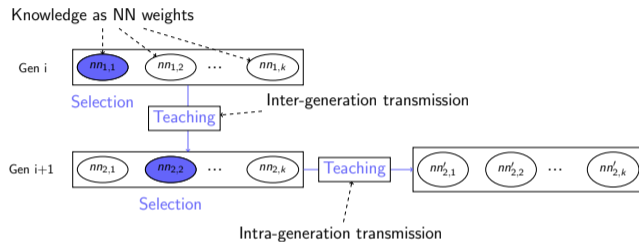
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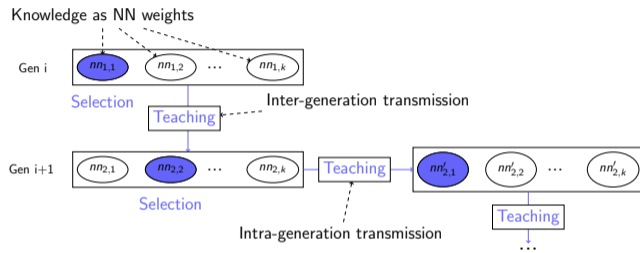
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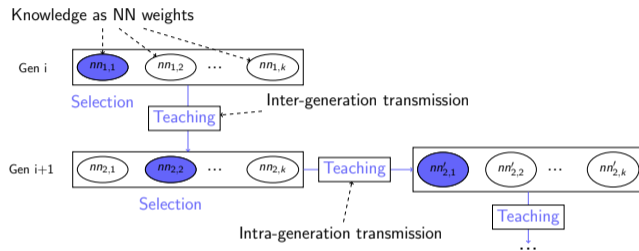
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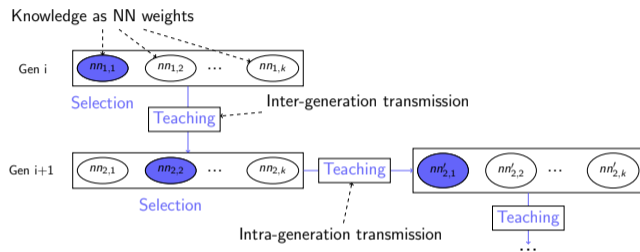
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- Inter-generation transmission improves knowledge if there is teacher selection and artificial noise.

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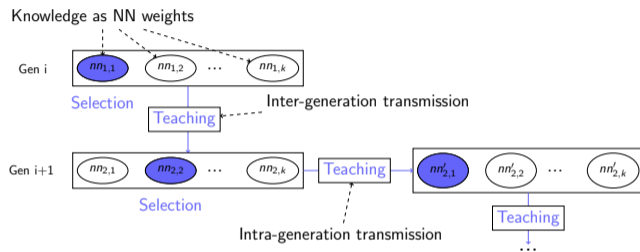
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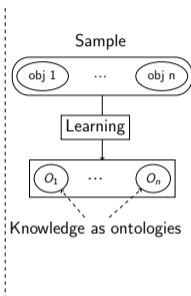
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- Intra-generation transmission provides oriented noise.

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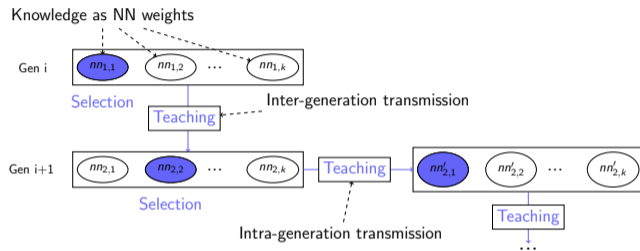
Bourahla et al, AAMAS 2021



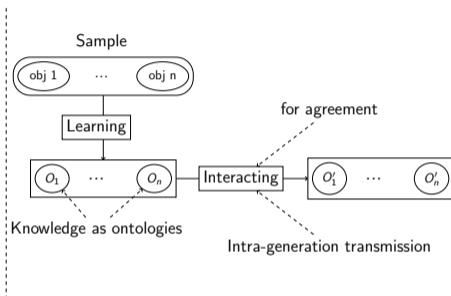
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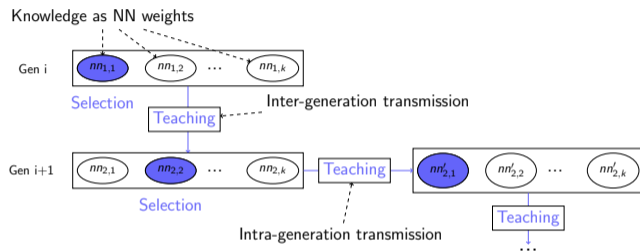
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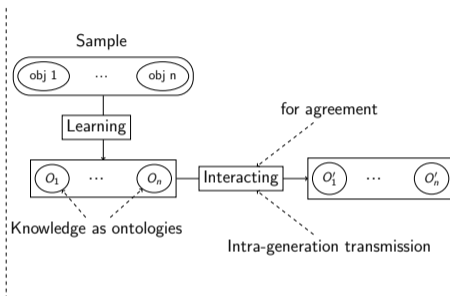
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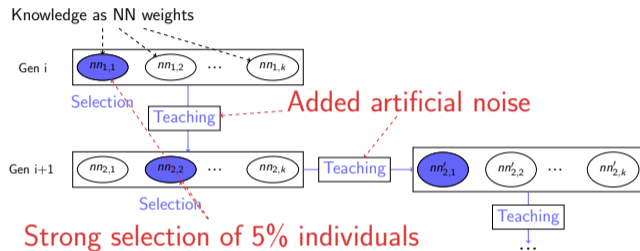
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- Successful interactions
- Improved knowledge quality
- Preserved diversity

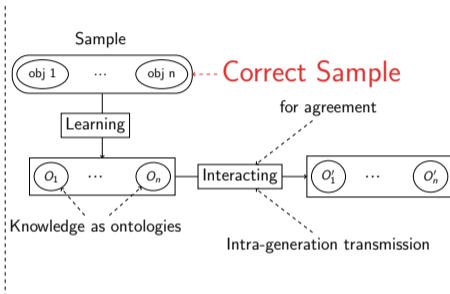
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Hypotheses

We relax these assumptions:

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- starting with correctly labeled sample.

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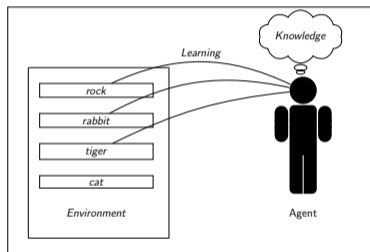
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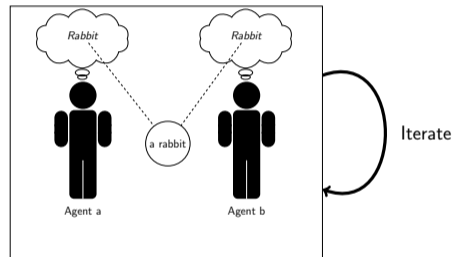
- H1 Inter-generation transmission improves knowledge **without** the need for teacher selection and artificial noise.
- H2 Intra-generation transmission can compensate for the lack of teacher selection.

Existing framework

Two phase experiment:

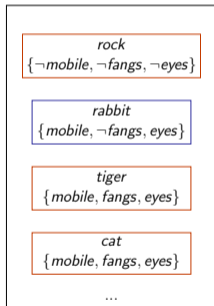


Learning



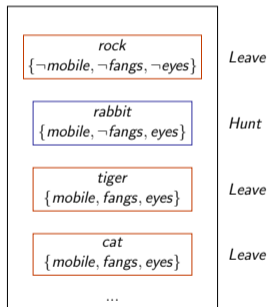
Adaptation

Agent learning



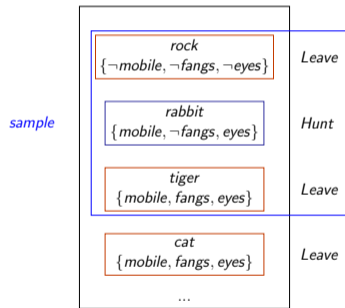
Environment

Agent learning

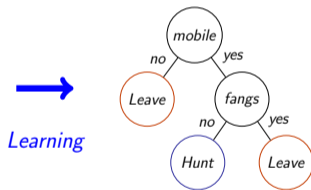


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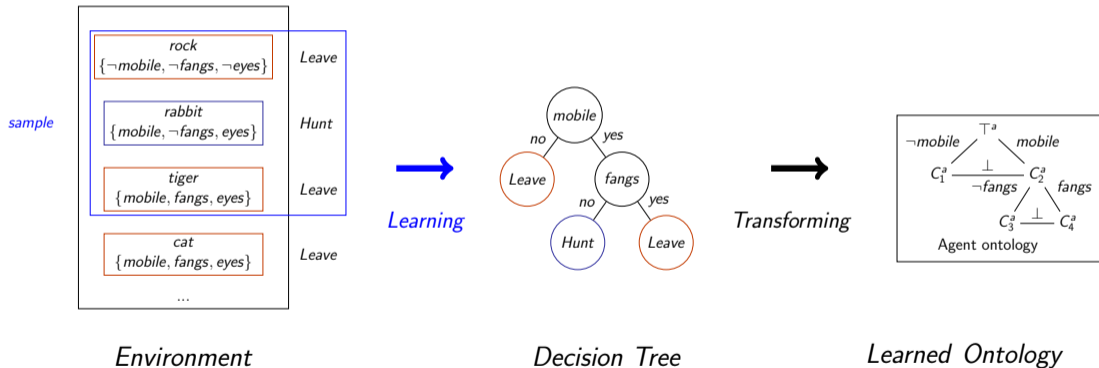


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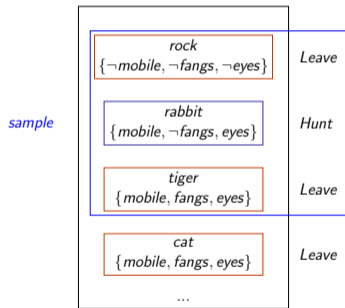


Decision Tree

Agent learning



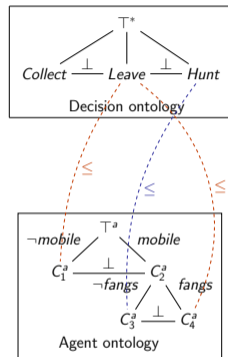
Agent learning



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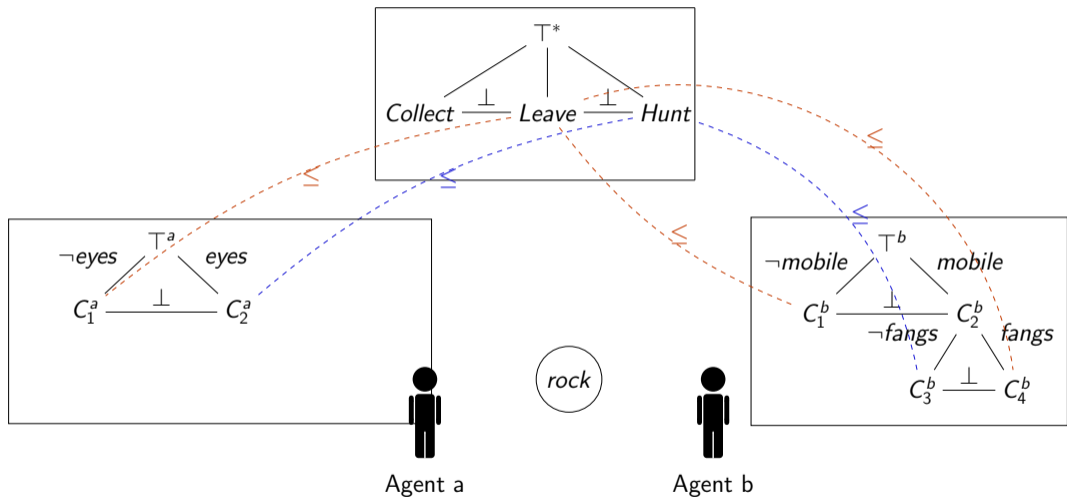


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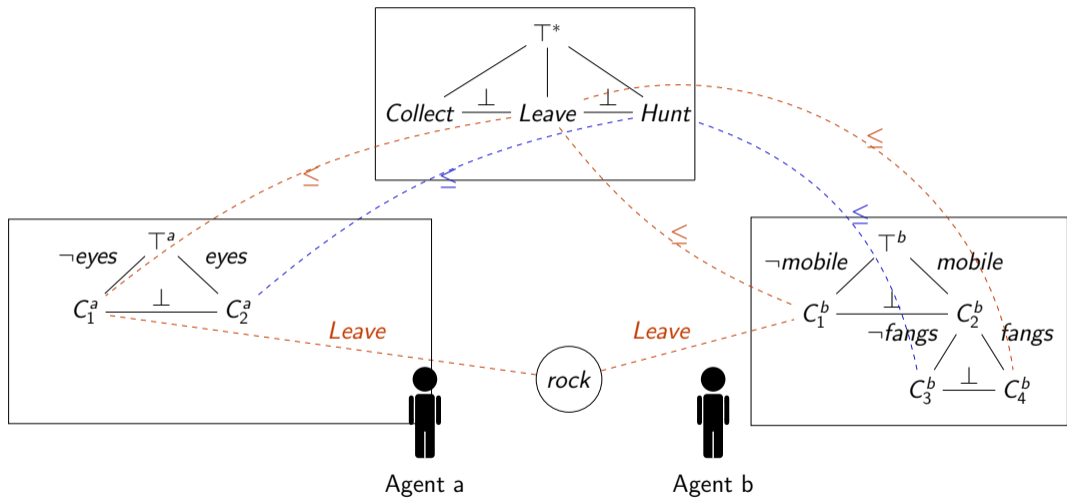


Learned Ontology

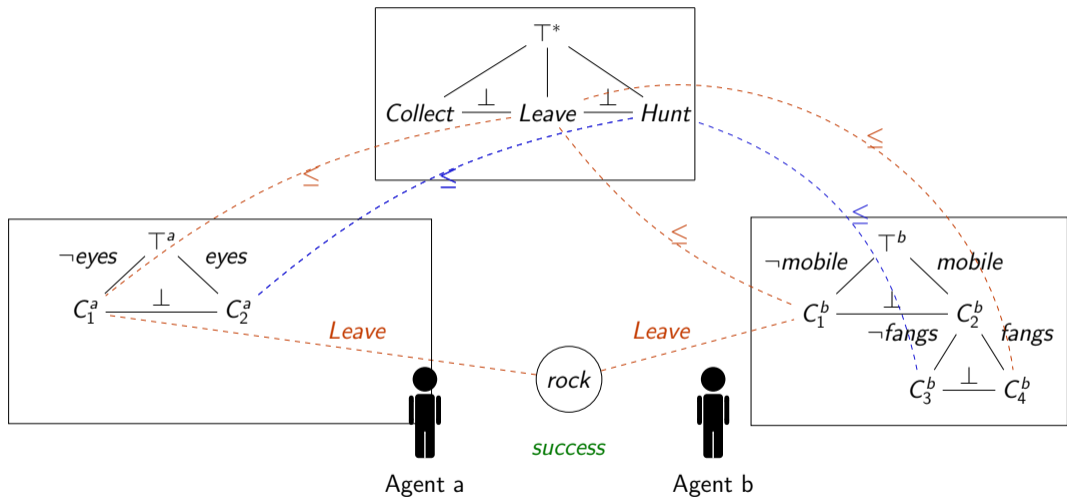
Agent-to-agent interaction



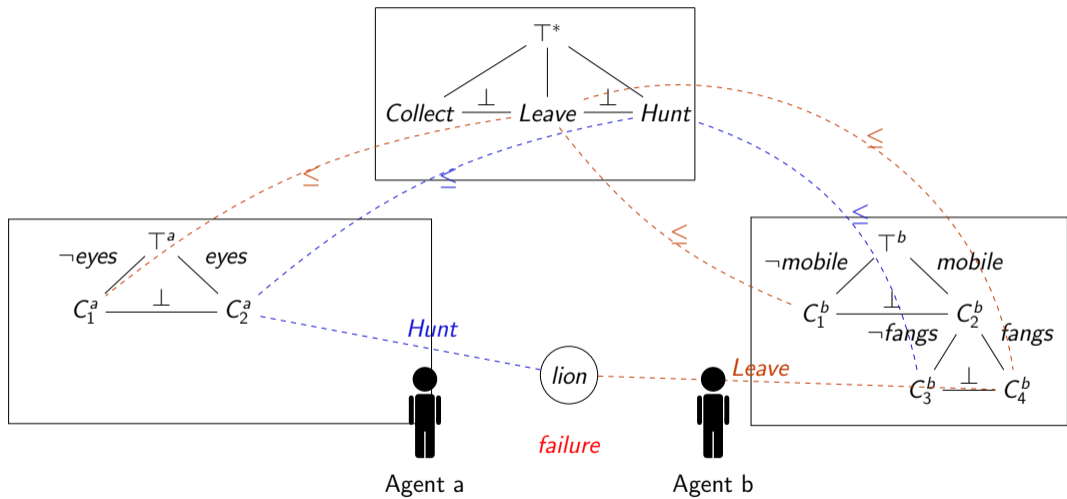
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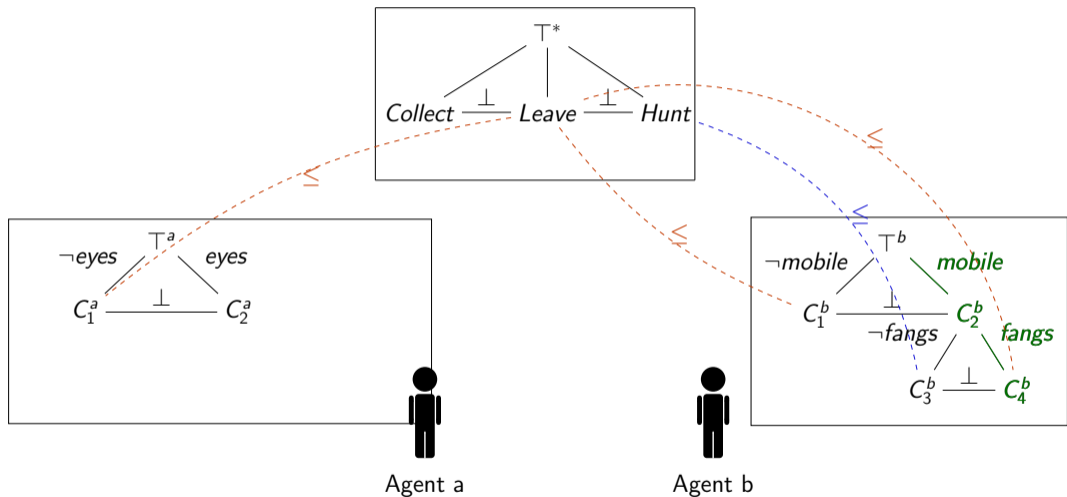
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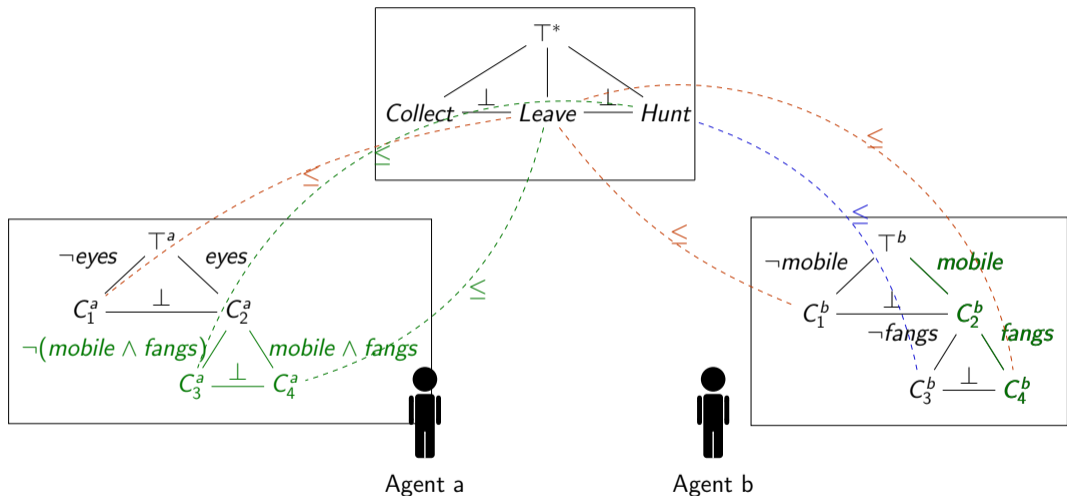
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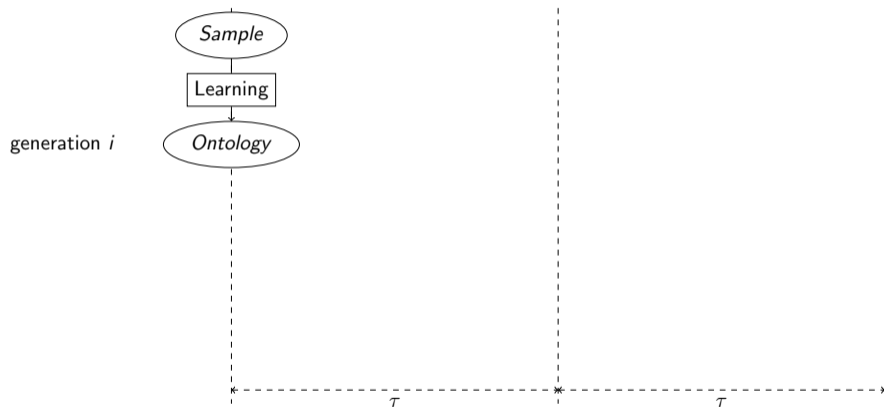


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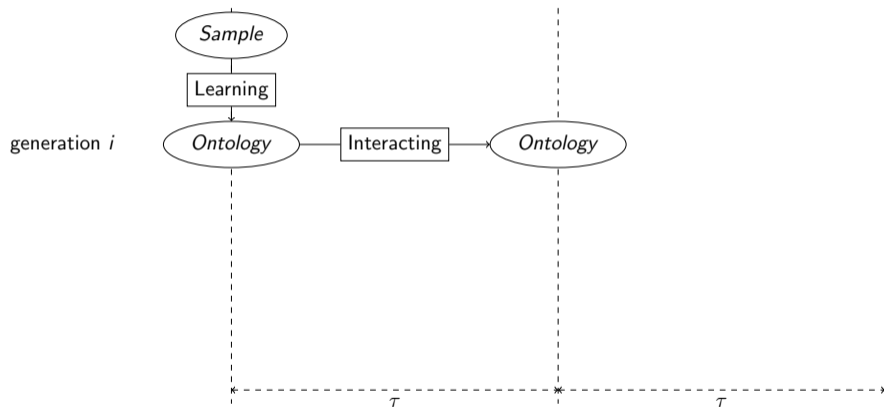
Process

Combining the two experimental frameworks.



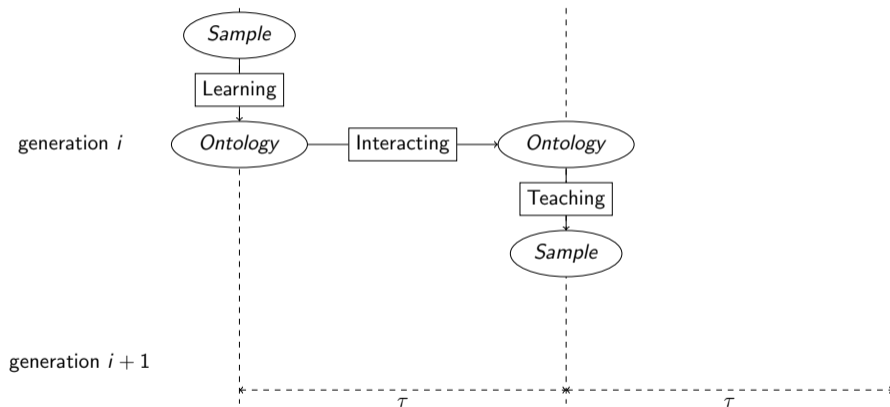
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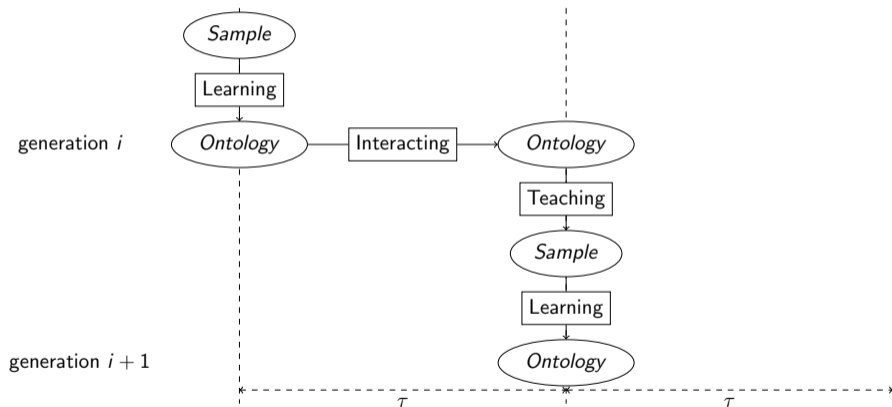
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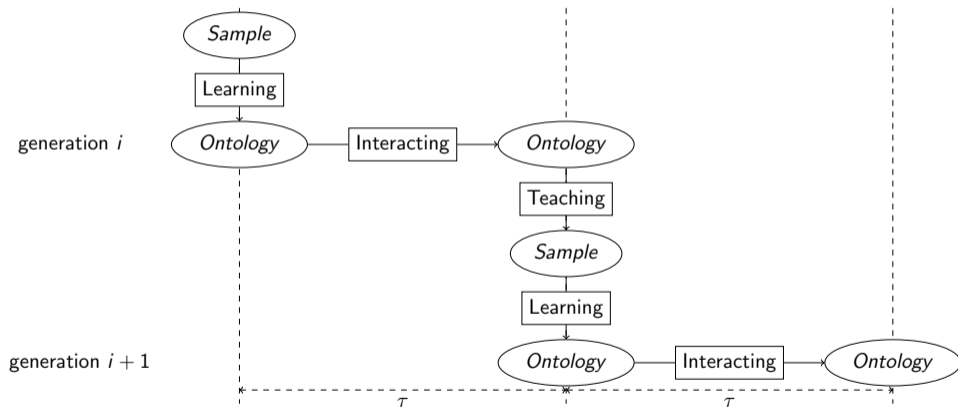
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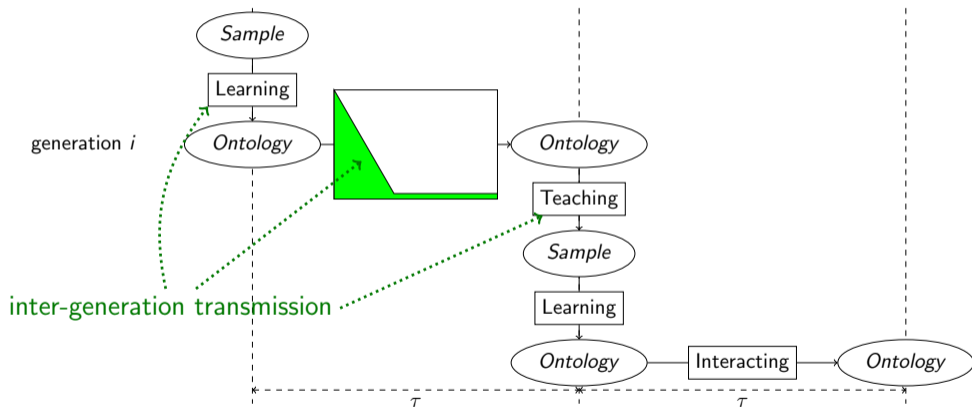
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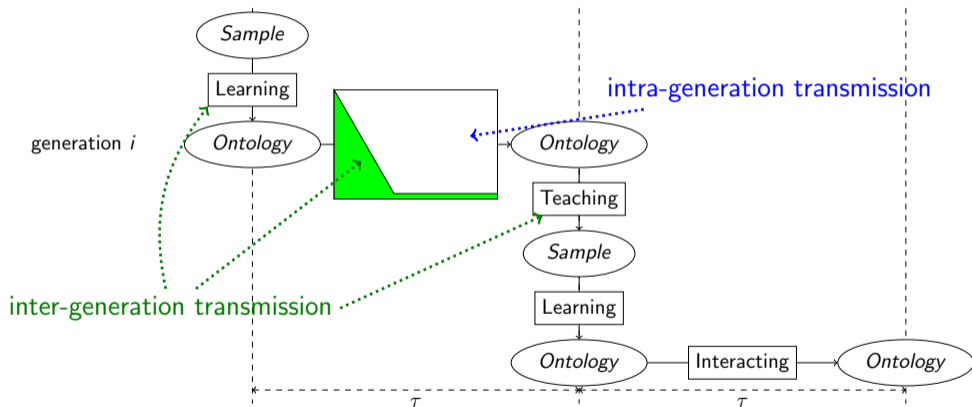
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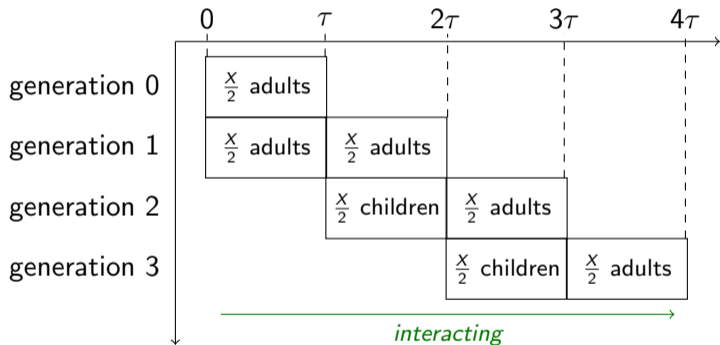


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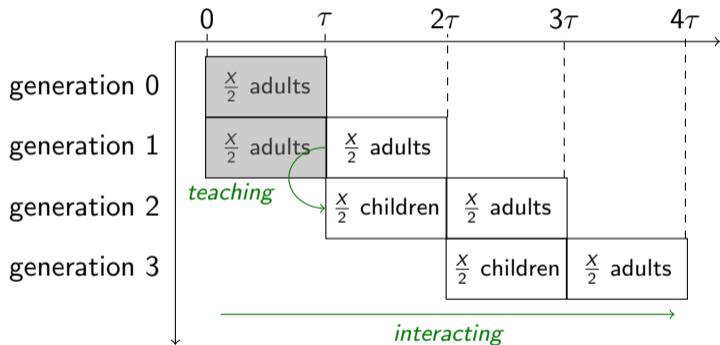
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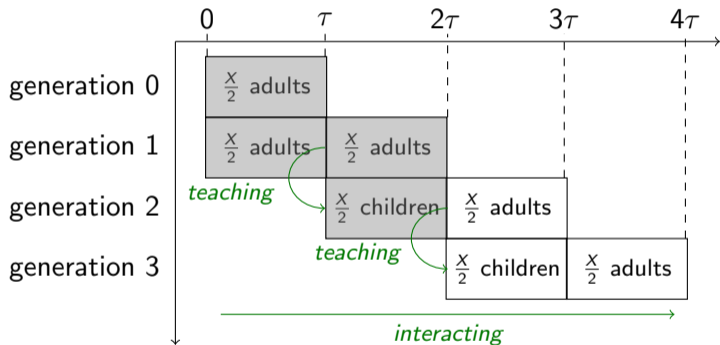
Agent life cycle



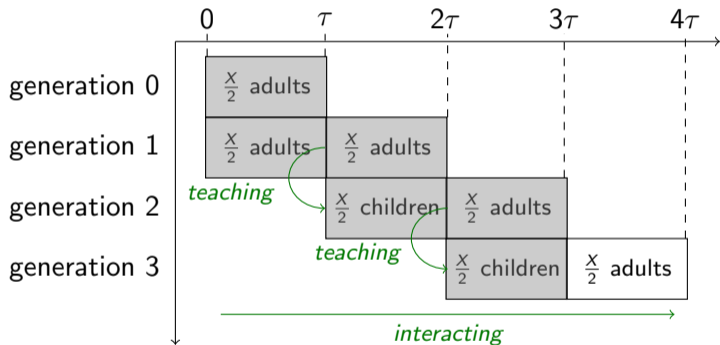
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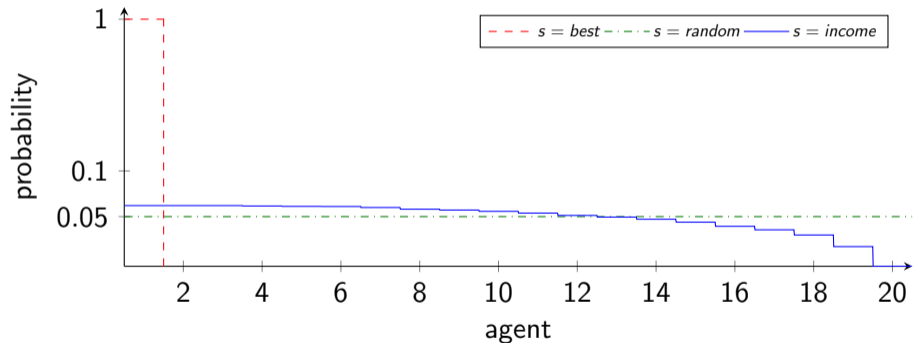


Agent life cycle



Agent Mating

Agent mating is based on the income they gather from the environment.



Experiments

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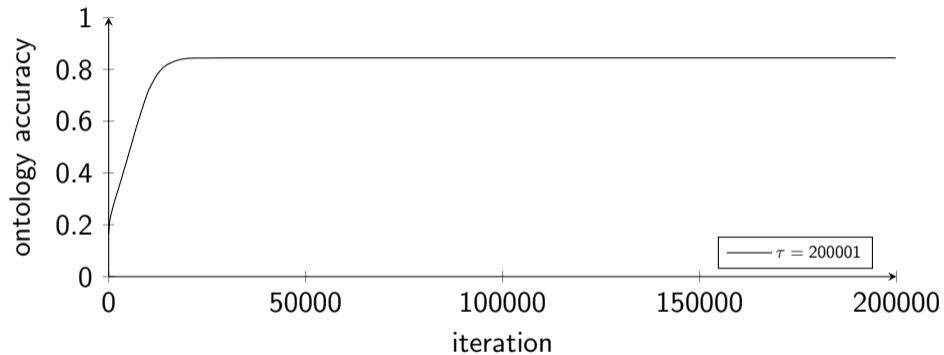
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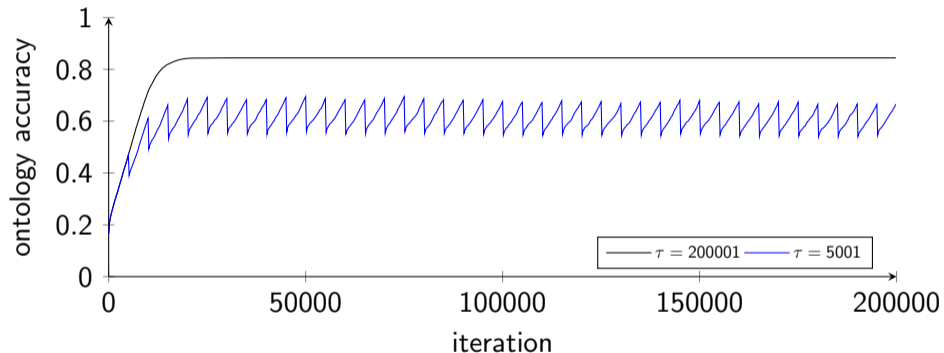
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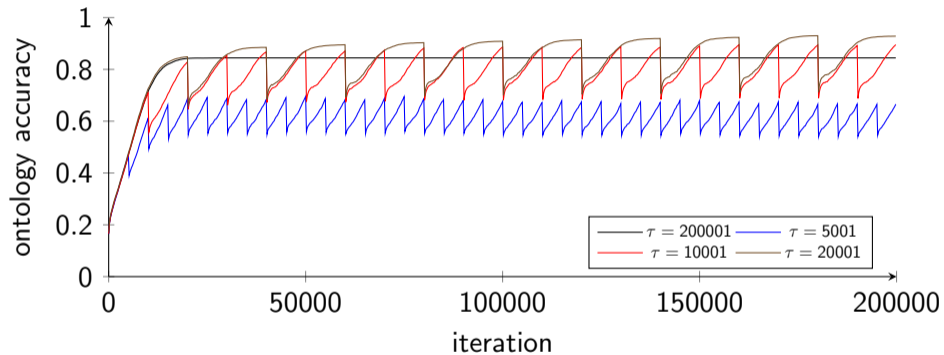
Inter-generation Transmission Improves Accuracy



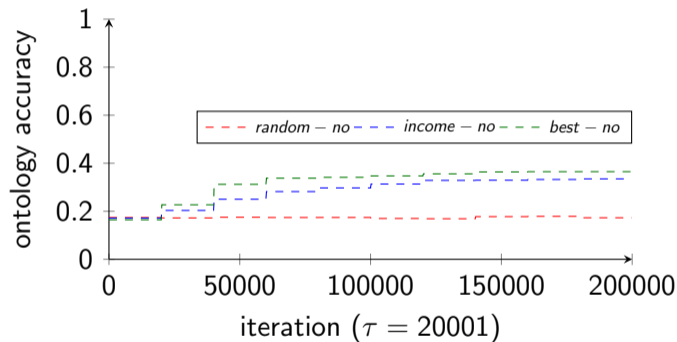
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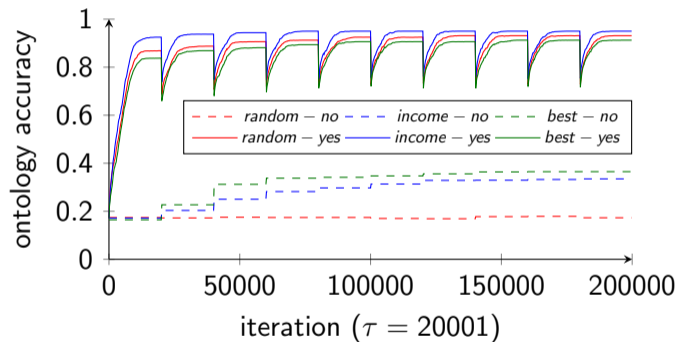
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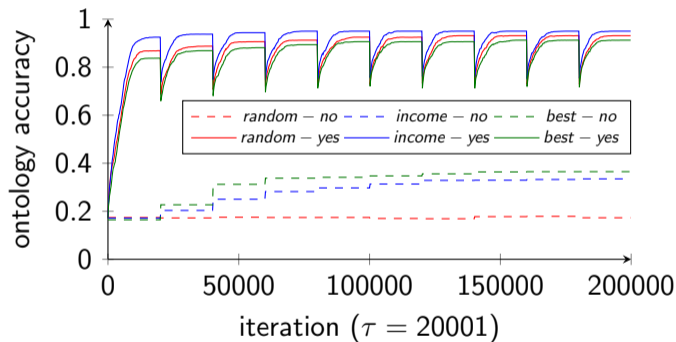
Intra-generation Transmission can Compensate for the Lack of Selection



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Intra-generation Transmission can Compensate for the Lack of Selection



<i>ht</i> \ <i>s</i>	<i>income</i>	<i>best</i>
<i>no</i>	$-.115 \pm .035$	$-.165 \pm .035$
<i>yes</i>	$-.01 \pm .04$	$.005 \pm .035$

95% confidence intervals of mean difference with random selection.

Conclusion and future work

- Confirmed that inter-generation transmission improves knowledge under relaxed conditions:
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 - ▶ No artificial noise.
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- Given different mating policies and transmission percentages.
- How does this affect the quality of agents knowledge.