

TDT4280 - Project

Evolution of language in Multiagent systems - Talking Heads (of Luck Steels)

March 13, 2012

Practical Information

- Deadline: **Friday 22.04.2012, 23:55**
- Delivery is a written report in pdf.
- You may deliver in pairs.
- You may write in english or norwegian.

Theoretical Questions

Task 1

Illustrate the interaction protocol that the Language Games framework uses. Explain your figure.

Task 2

What kind of control structure does the Language Games framework employ? Explain referring to other control structures you have learned in this course.

Practical work with THSims

THSims is a simulation toolkit for studying aspects of language evolution. You will use this simulator in this practical part of the assignment.

The simulator can be downloaded here: <http://ilk.uvt.nl/~paul/thsim.html>

Before you start, you should read:

- *THSim v3.2: The Talking Heads simulator tool*
- *Rough guide to use THSim v4.0*

You will find these papers and other information here: <http://ilk.uvt.nl/~paul/thsim.html>

For this part of the exercise, you are supposed to investigate the issues stated in Task 3-5. For each task you need to:

- **Design experiments.** It should be possible to redo the experiments from the documentation in the report.
- **Visualize** the results with graphs, tables etc.,
- **Interpret** the results.
- **Discuss** the results. Why do you think you got these results? Can you relate them to situations in real life, communication between people?

Task 3 - Who should we learn from?

Objective: *Investigate the effect of learning from experienced agents compared to agents on the same level.*

If you only play one iteration, all agents are considered equal, and they all start from scratch. If $nIter > 1$, there is a population turnover where a part of the population will be adult agents, agents who lived at the previous iteration, and a part learners, new clueless agents. You can choose the probability that the speaker/hearer is selected from the adult group with the parameters $pAdultSpeaker/pAdultHearer$.

Your task is to investigate the effect of learning from other agents at the same competence level versus learning from agents on a higher or lower level. For example, how many experienced agents compared to novice agents should there be in a group to make it able to generate a common language pretty fast? (Compare with using only adults as teachers and with all agent equal.) Is it useful for the adults to learn from the new generation?

Task 4 - What is the best way to learn?

Objective: *Investigate the effect of varying game types.*

The different game types, *observation game*, *guessing game* and *selfish game* represents the three learning paradigms supervised-, reinforcement- and unsupervised learning respectively. The task is to investigate the effect of applying these different learning paradigms, both by keeping the language game fixed during one simulation and by varying the game types in one simulation.

In addition to investigating this issue by itself, we want you to relate it to the question in task 3. Does the choice of effective learning mechanism depend on who you learn from?

Task 5 - Define your own objective to investigate.

Define your own objective or hypothesis to investigate within this framework. In the Rough guide there is a list of parameters you can change. If you want, you can also extend the code to make new types of experiments possible. (The code must then be included in the delivery.)

As you did with the previous tasks, you should, in addition to stating the objective, define experiments, interpret results and discuss the results.