

Auto-organisation of shared lexicon: Embodied guessing game model -Luc Steels

Term Project for CS784

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Introduction

- An attempt to derive a lexicon in multi-agent multi-object environment
- Model proposed by Luc Steels and Paul Vogt in 1997- “Grounding adaptive language games in robotic agents”
 - Making contact
 - Topic identification
 - Perception
 - Encoding
 - Decoding
 - Feedback

- Model further analyzed in “Collective learning and semiotic dynamics”-Luc Steels, F Kaplan; 1999
 - Conceptualisation module
 - Verbalisation module
 - Semiotic landscape

- The simulation aims at getting a shared lexicon using agents which are
 - Embodied
 - Grounded
 - Autonomous
- Agents do not have an insight into the state of another agent.
- One Speaker- one hearer model

System

- Environment
 - Agents
 - Objects
 - Forms
- Agent
 - Role
 - AgentID
 - Scorecard

- Object
 - Properties
 - ObjectID
- Property
 - Name
 - Value

Simulation

- Init environment
- pick agents → speaker/hearer
- Speaker picks object → chooses topic
- Speaker chooses form
- Hearer guesses object/requests object
- Speaker tells object
- Scores updated

Failure scenario

- Game #392
- Agent#1 is the speaker
- Agent#2 is the hearer
- Object#2 is the referent
- Using utterance#3 for Attribute#2 = 0
- Object Guessed: Object#3
- **Failure.** Decrementing speaker.scorecard[2][3] and incrementing hearer.scorecard[?][3]

Success scenario

- Game #399
- Agent#3 is the speaker
- Agent#1 is the hearer
- Object#3 is the referent
- Using utterance#3 for Attribute#1 = 0
- Object Guessed: Object#3
- **Success.** Incrementing speaker.scorecard[0][3] and hearer.scorecard[0][3]

Sample Agent Lexicon

- Agent# 0

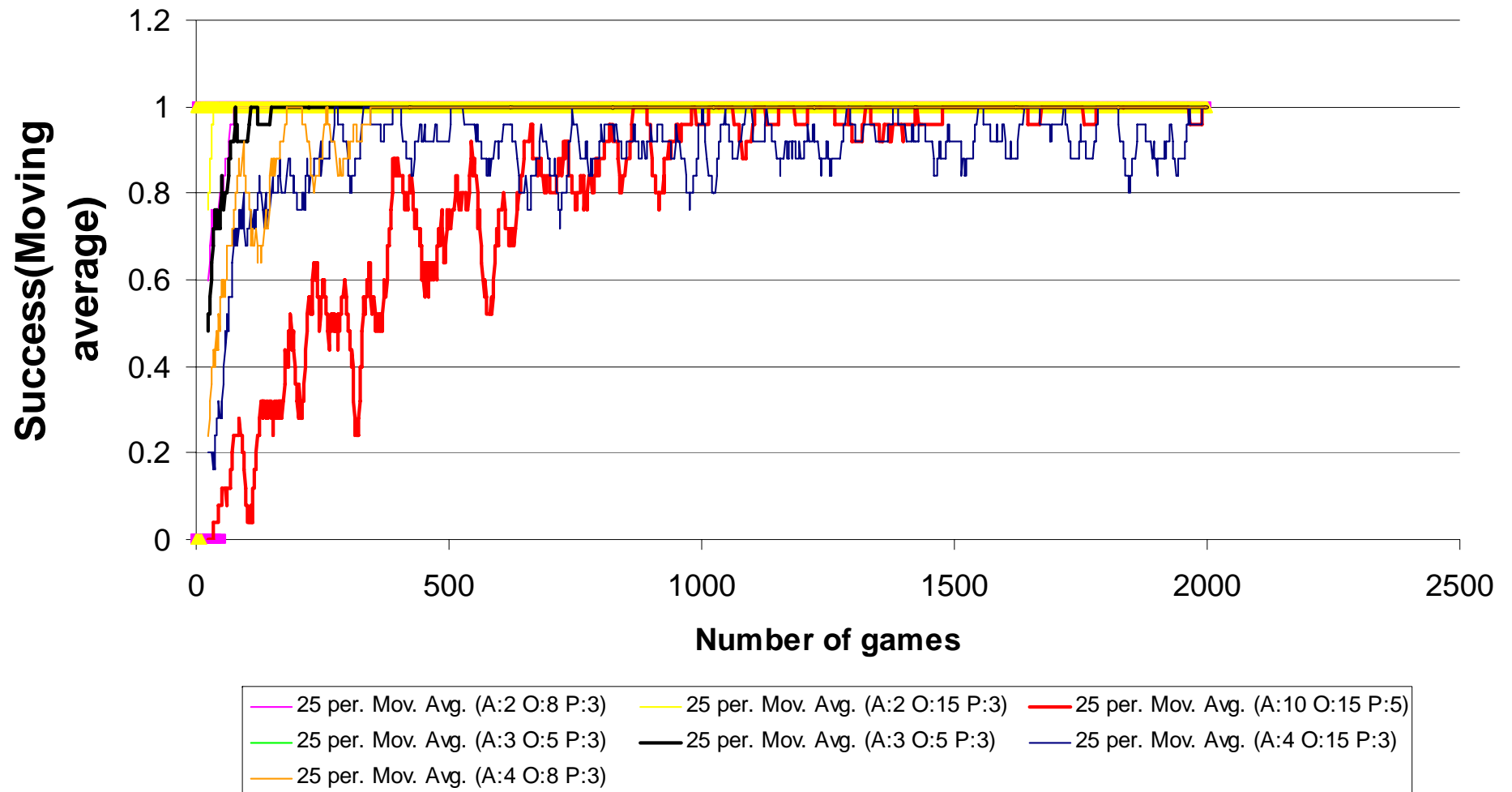
- 38 1 9 22 5 1 18 11 1
- 17 2 3 19 1 -1 3 10 10
- 28 3 6 56 5 -1 3 2 5

- Agent# 1

- 16 -1 -1 11 4 1 7 22 1
- 11 2 0 17 4 4 5 5 -1
- 29 3 3 40 5 9 5 7 -1

Result from Simulation

Embodies Guessing game model



References

- “Grounding adaptive language games in robotic agents” - Luc Steels and Paul Vogt; 1997
- “Collective learning and semiotic dynamics” - Luc Steels, F Kaplan; 1999
- “Bootstrapping Grounded Word Semantics” - Luc Steels, F Kaplan

Questions??

- Thanks