Language-Grounded Multi-Agent Learning

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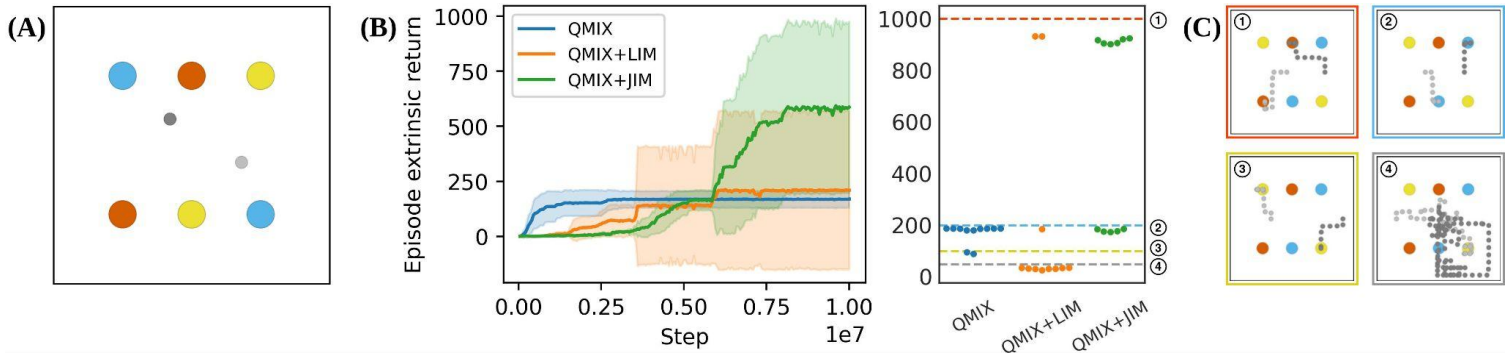
AAMAS Short paper

JIM paper accepted at AAMAS 2024 (6-10 May 2024, Auckland) as **Extended Abstract** + Poster

=> Condense paper to 2 pages + 1 page of reference:

- Keep only important parts: Intro, Method, Experiments, Discussion
- Keep only one setup in Experiments: coordinated placement

\+ Publish full version on Arxiv



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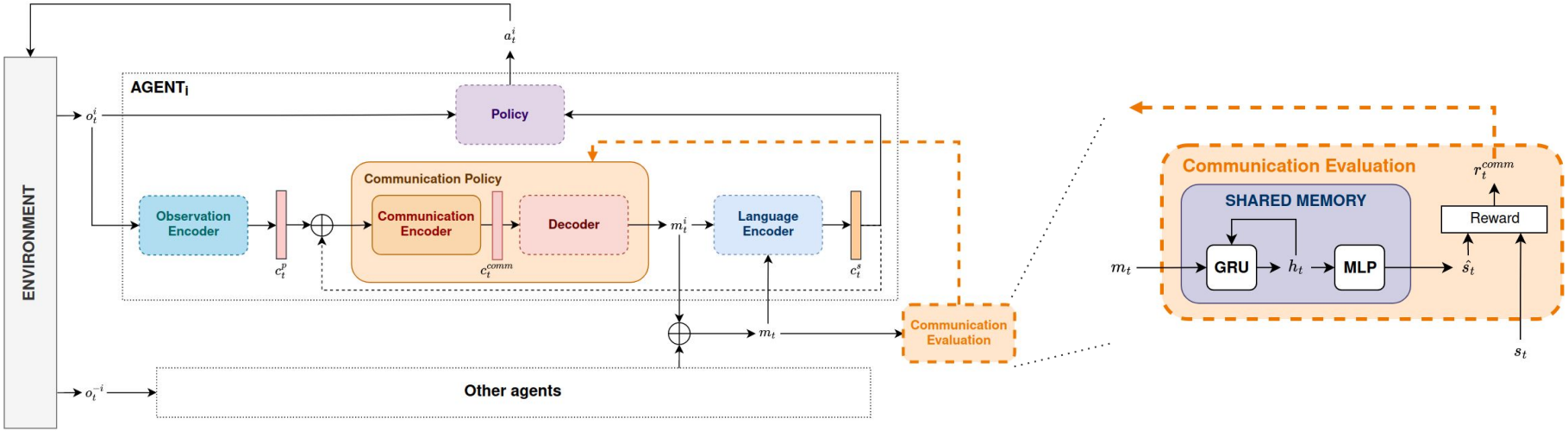
Last time



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Early results with Shared-Memory

- Communication works ok
  - \+ some informative true messages
  - \+ don’t communicate every time
  - \- some bad messages
- Shared-Memory does not work very well
  - \- rewards some bad messages
  - \- penalize some good messages
  - \- randomly reward/penalize empty messages
- … but still helps communication to not drift too much

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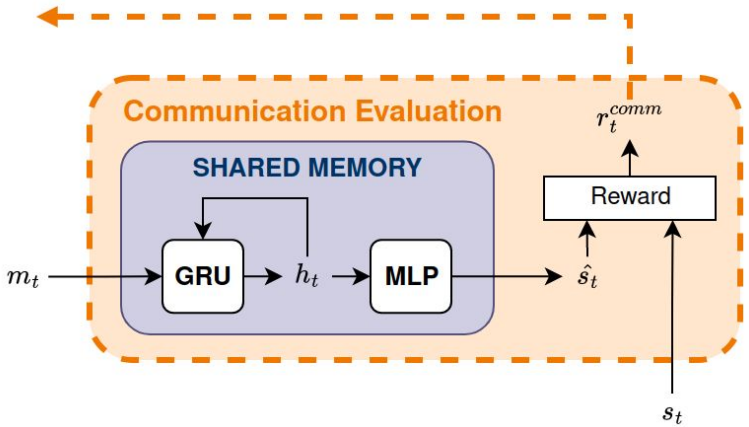
Issues with the Shared-Memory

- Predicts a state with very little information
  - ⇨ always guessing
  - ⇨ random-like rewards
- Messages don’t communicate information about individual states, rather subsets of state space
- Requires more expert information (global states)



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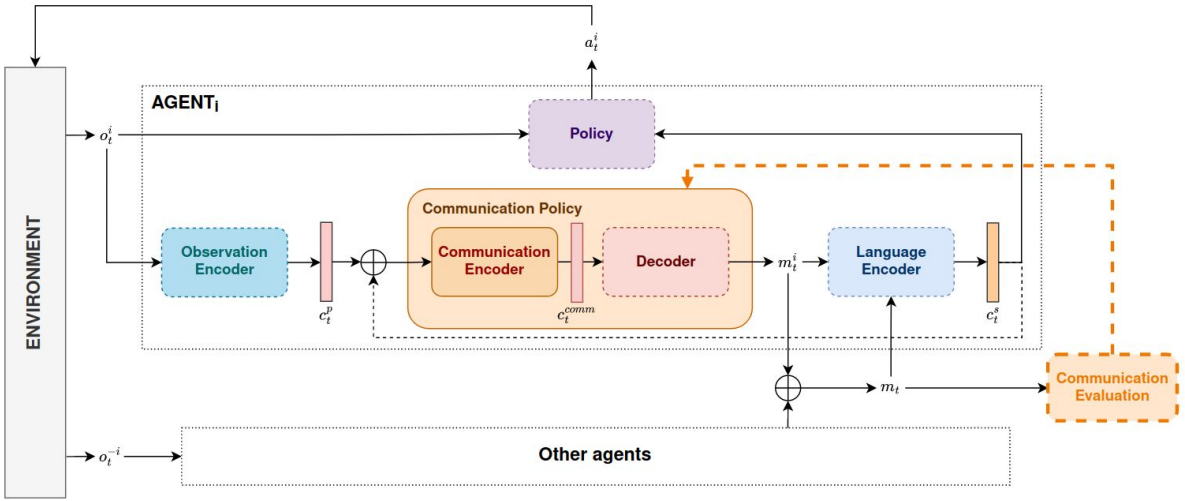
Simplify the architecture

- Architecture is too complex
  - Two MAPPOs
  - + Language Modules
  - + Shared Memory
- Communication Encoder is learnt from scratch during fine-tuning



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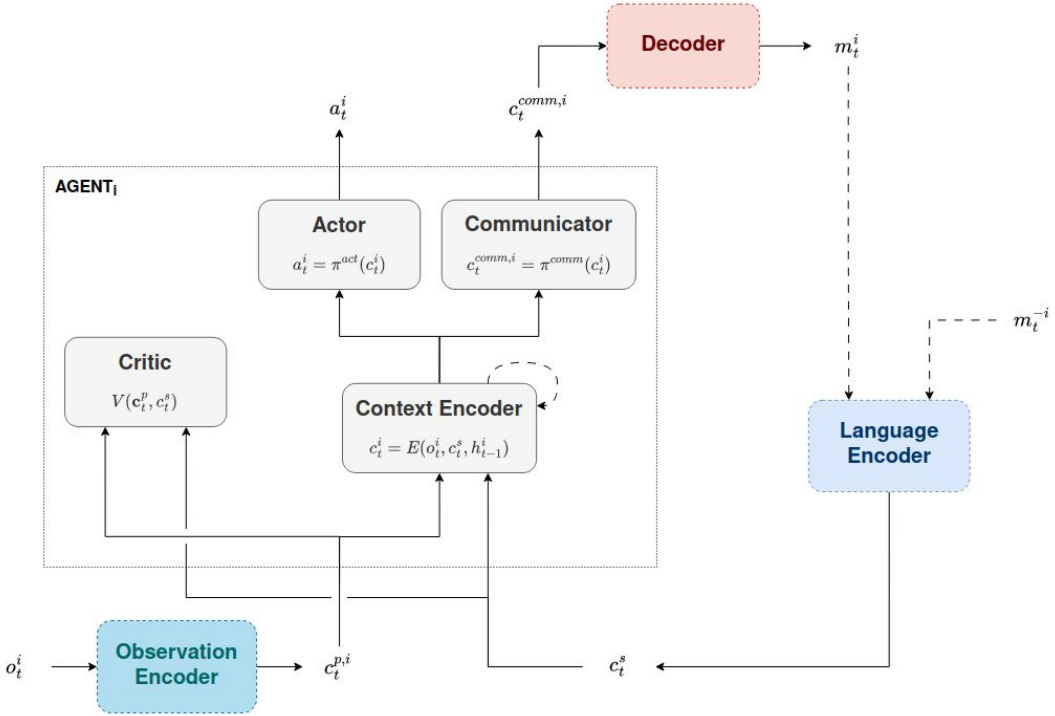
Arctor-Communicator-Critic archi



- One MAPPO with 2 policy heads
- Can train two heads separately with different losses
- Can pre-train Context Encoder with gradients from RL and language
- Can train Communication head from RL and language at the same time

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Arctor-Communicator-Critic archi: Early results

- Pre-training works well
- Sharing parameters between agents makes task way easier
- Emergent communication is not that simple

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Objectives

Show the advantages of using language

- Generalization
- Adaptation
- Universality
- Interpretability
- Interaction

Planning

- **Now-11/02:** Write AAMAS Short Paper
- **Now-15/02:** Work on ACC
  - Dev separate agents
  - Dev agent modules learn from language
  - Dev fine-tuning phase
  - Design experiments for showcasing language qualities
- **15/02-May:** Write memoir
  - Article/chapter on ACC
  - rest

Thank you for you attention !

Questions ?