Progress Presentation
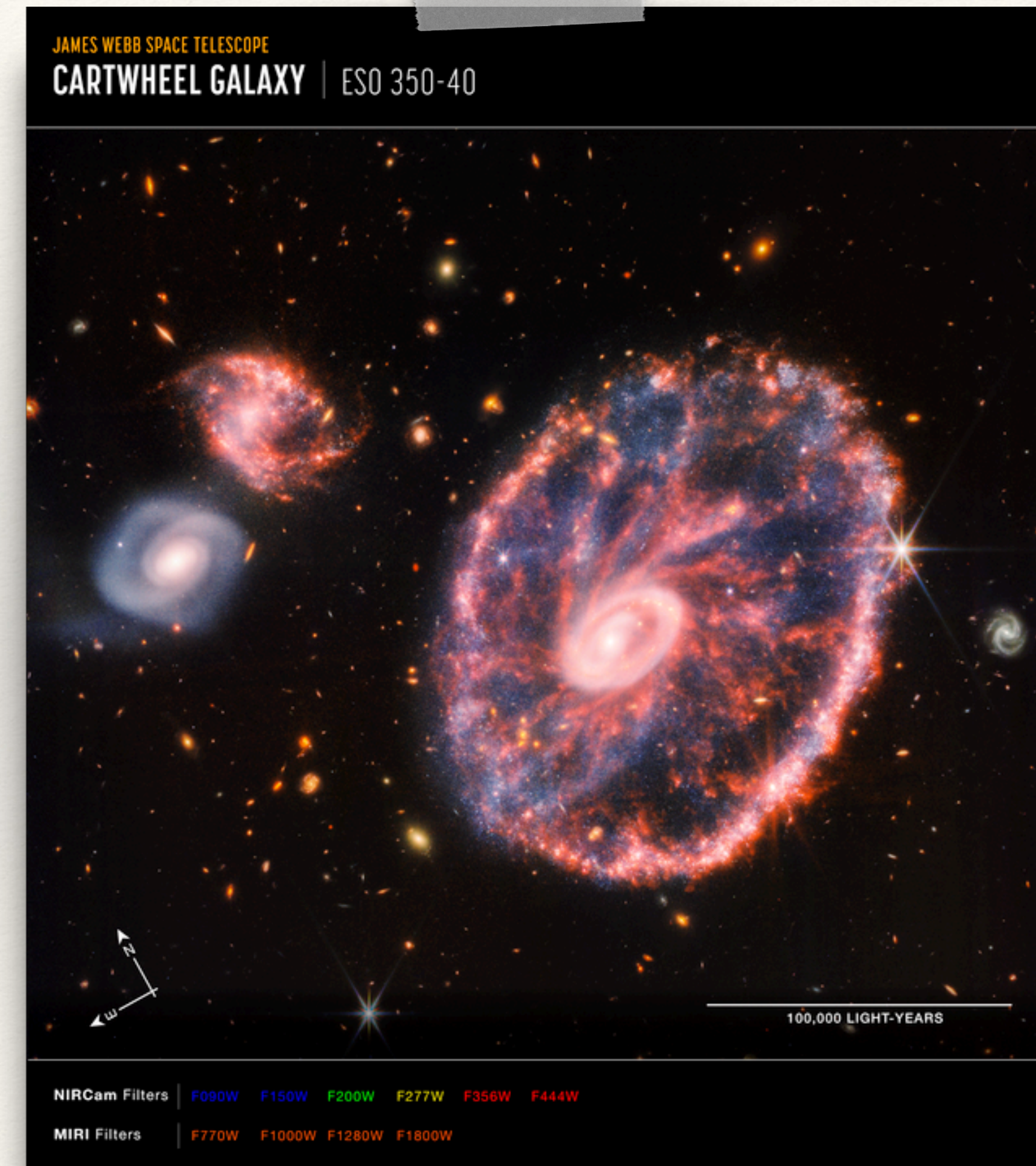
June 15th - June 27th
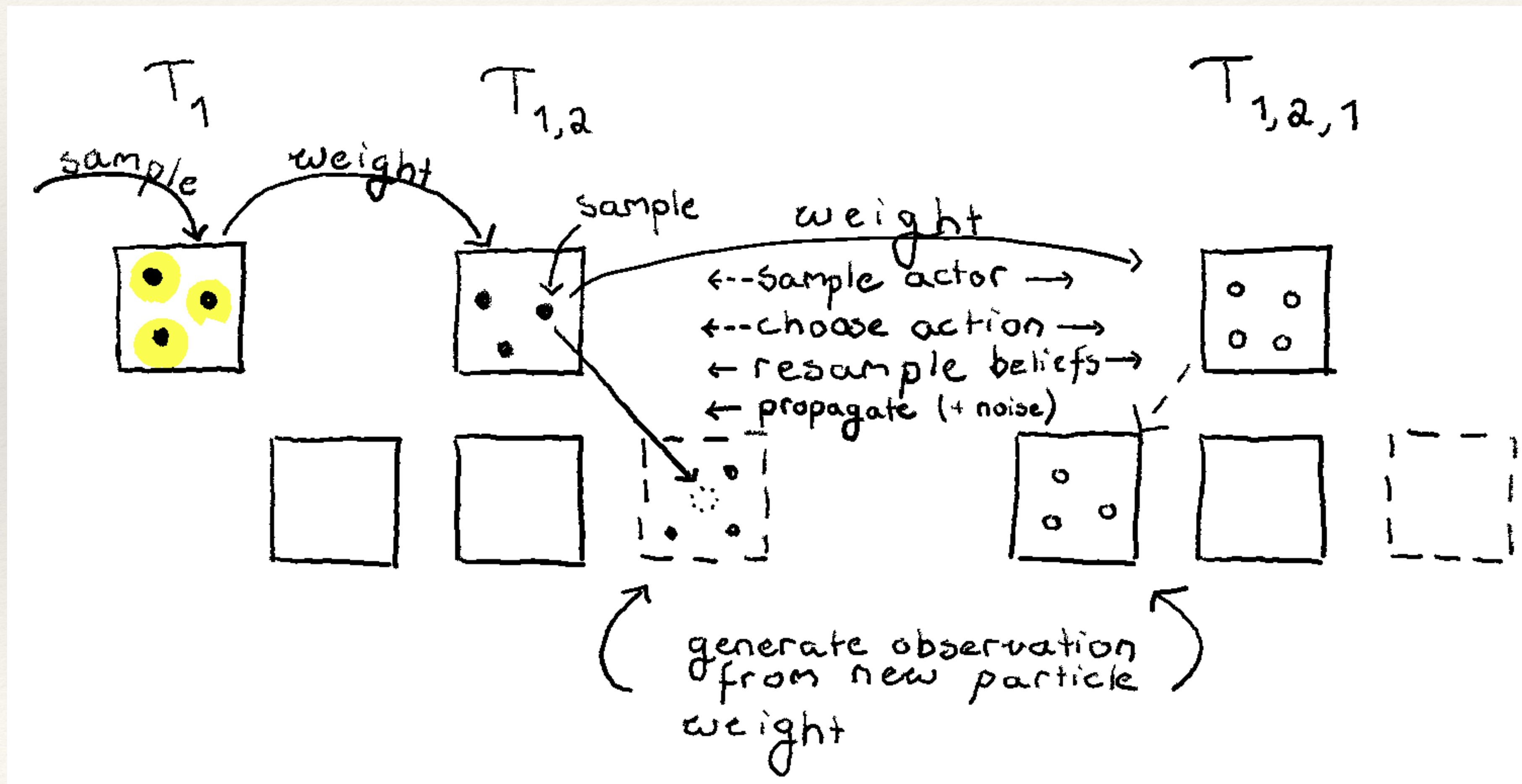
Agenda

- description of final (?) algorithm

- plots for choosing appropriate parameters

- the issue of "mismatch" between predicted and actual action
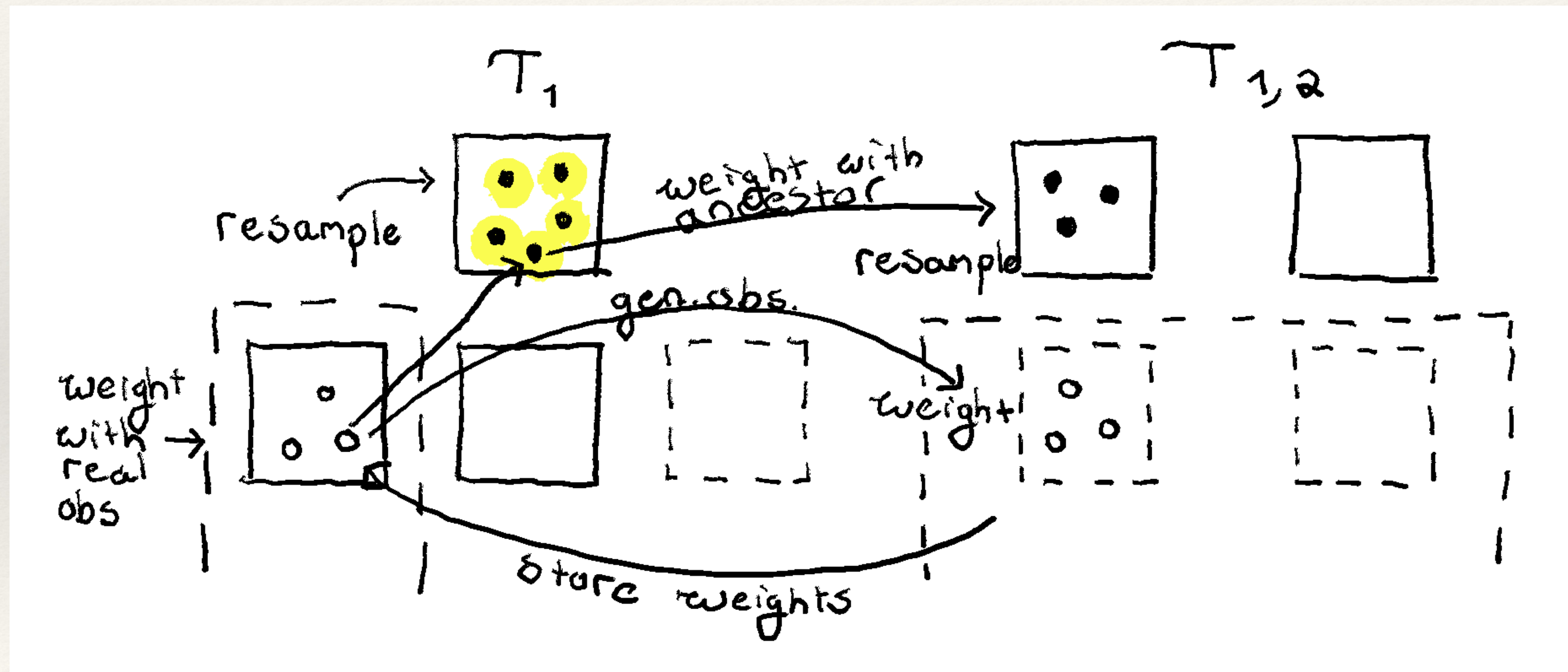
- other progress

- discussion of schedule

Final (?) algorithm

Planning

Final (?) algorithm

Belief Update

Choosing Solver Parameters

Number of samples

- one simulation
- two agents
- exploration coefficient 0.5
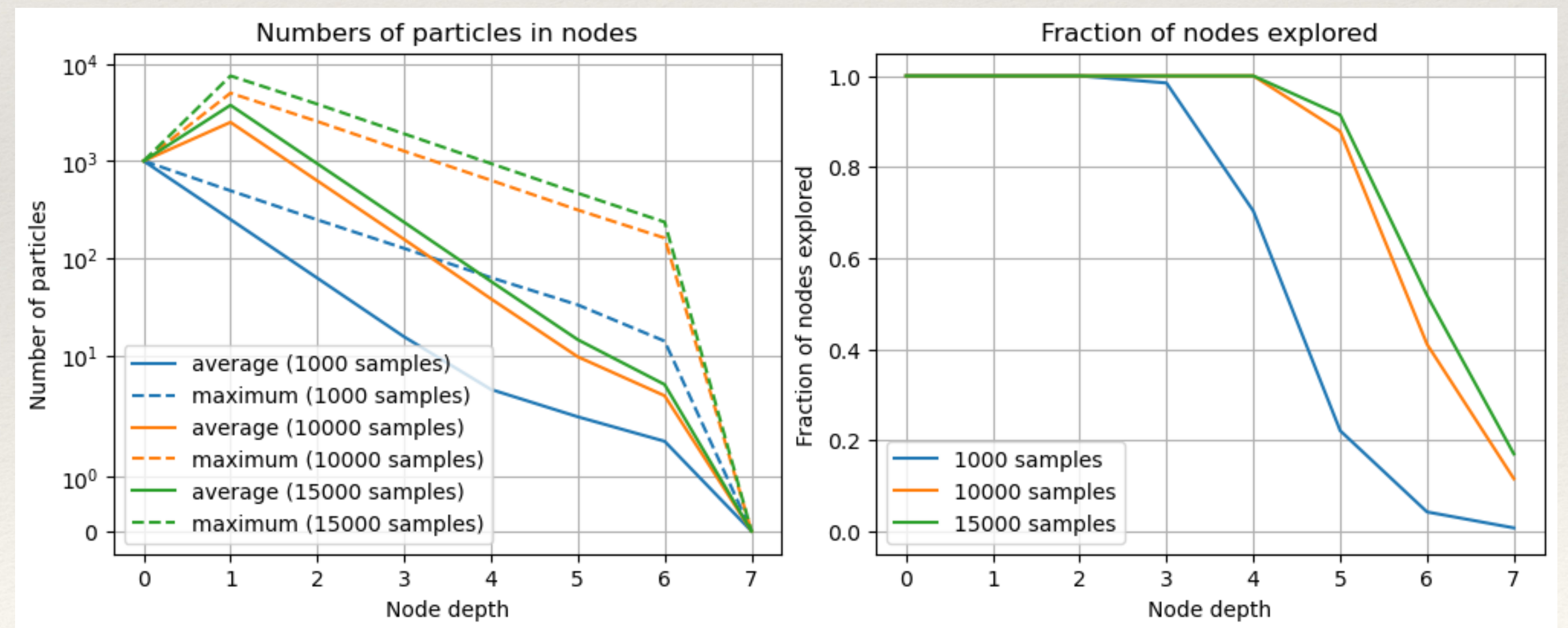- reasoning level 0
- only first time step
- results from one agent's tree
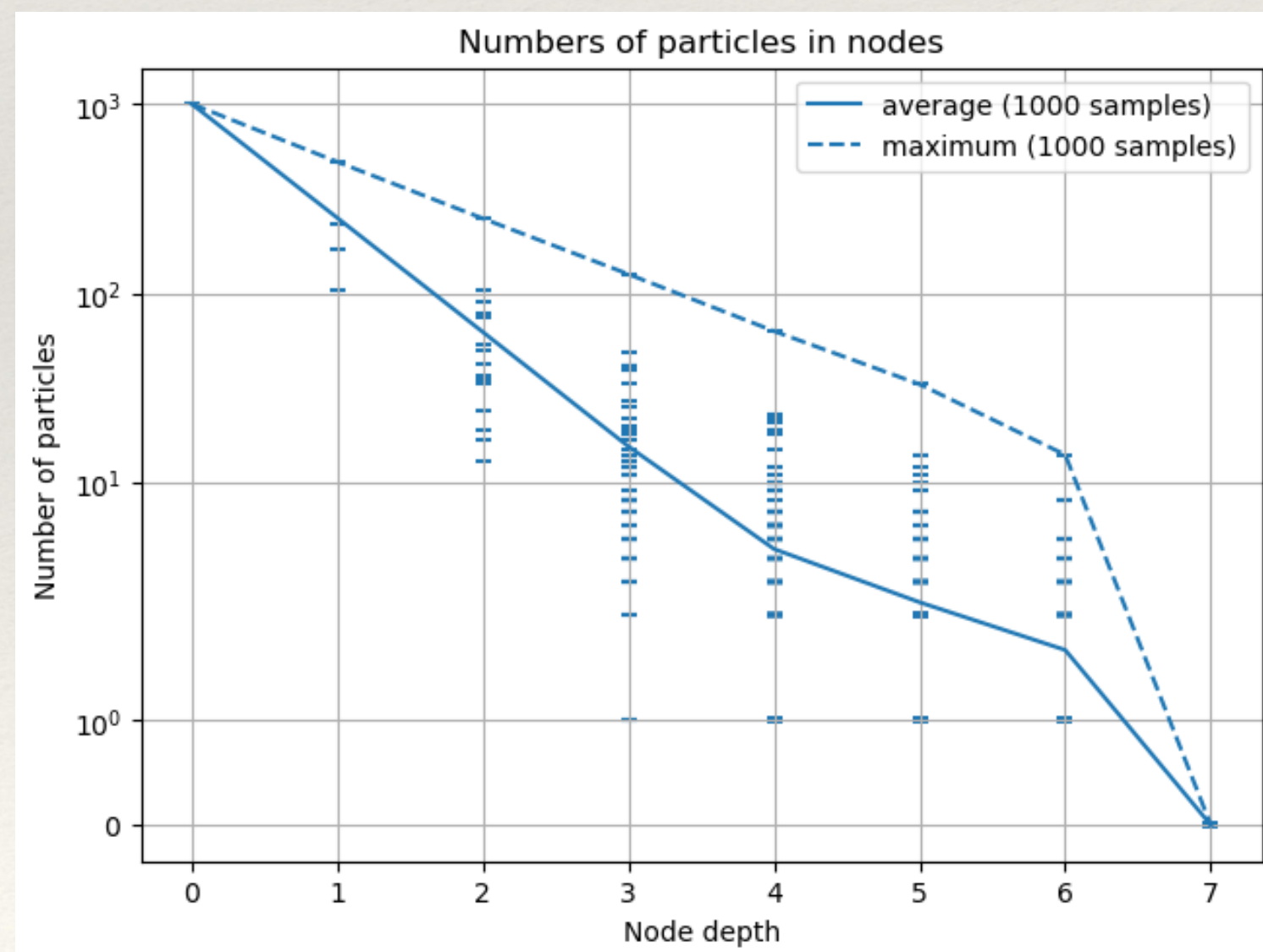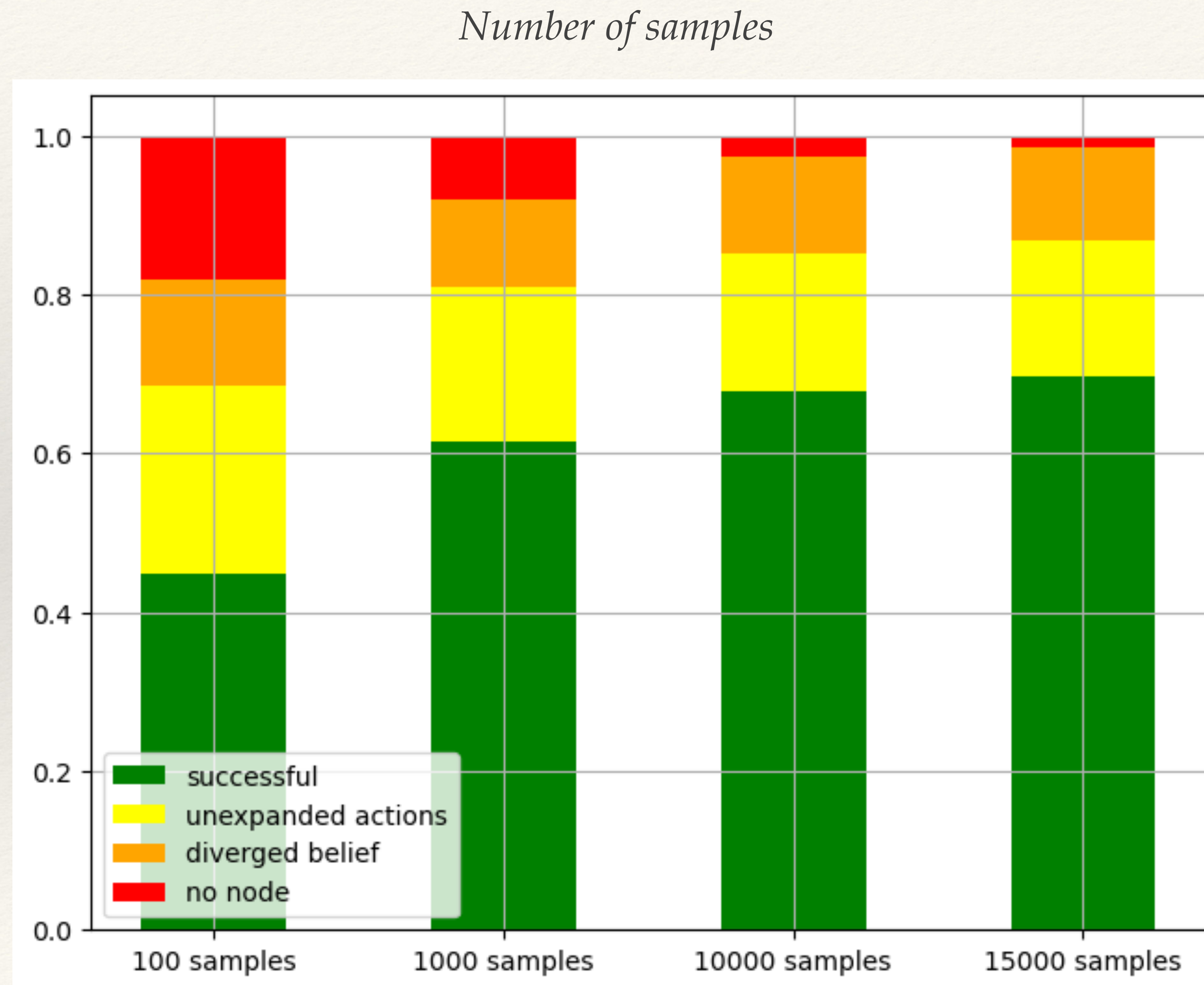
Choosing Solver Parameters

- one simulation
- two agents
- exploration coefficient 0.5
- reasoning level 1
- only first time step
- results from one agent's tree

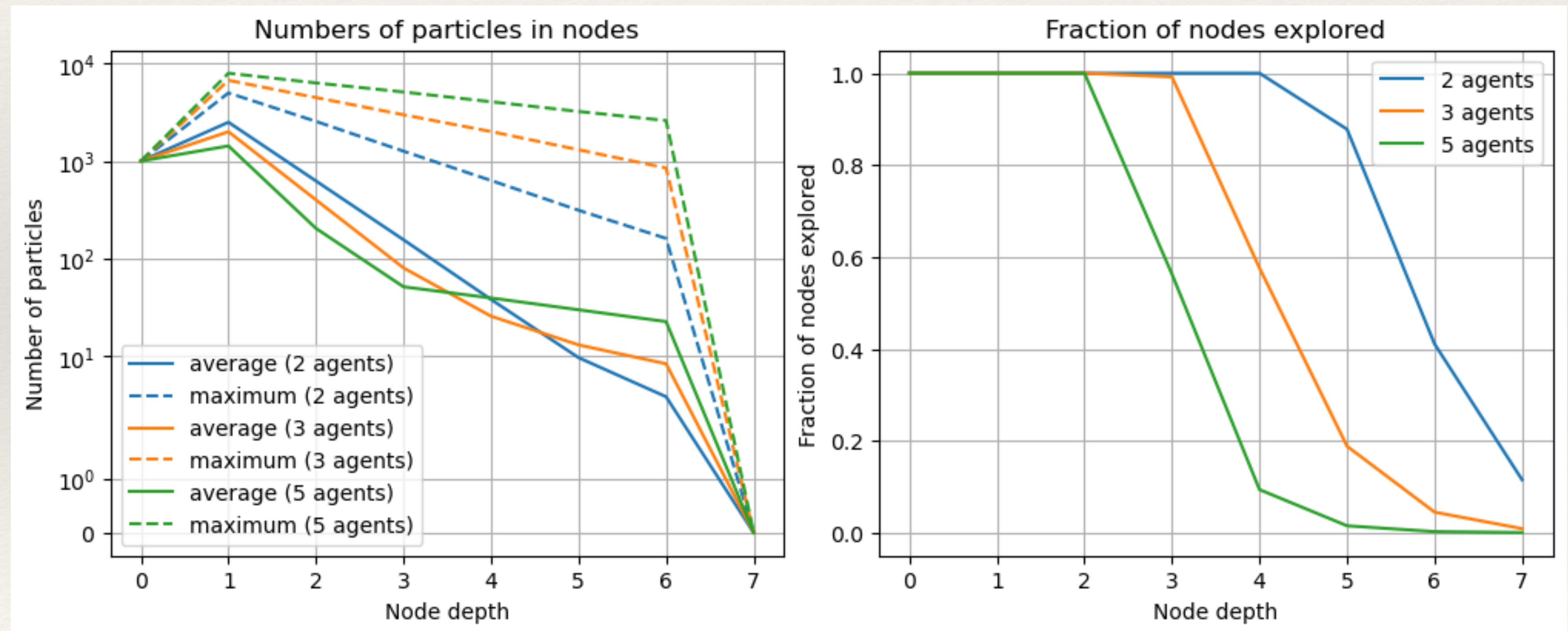*Number of samples*

Choosing Solver Parameters

- one simulation
- 10k samples
- exploration coefficient 0.5
- reasoning level 0
- only first time step
- results from one agent's tree

Influence of number of agents

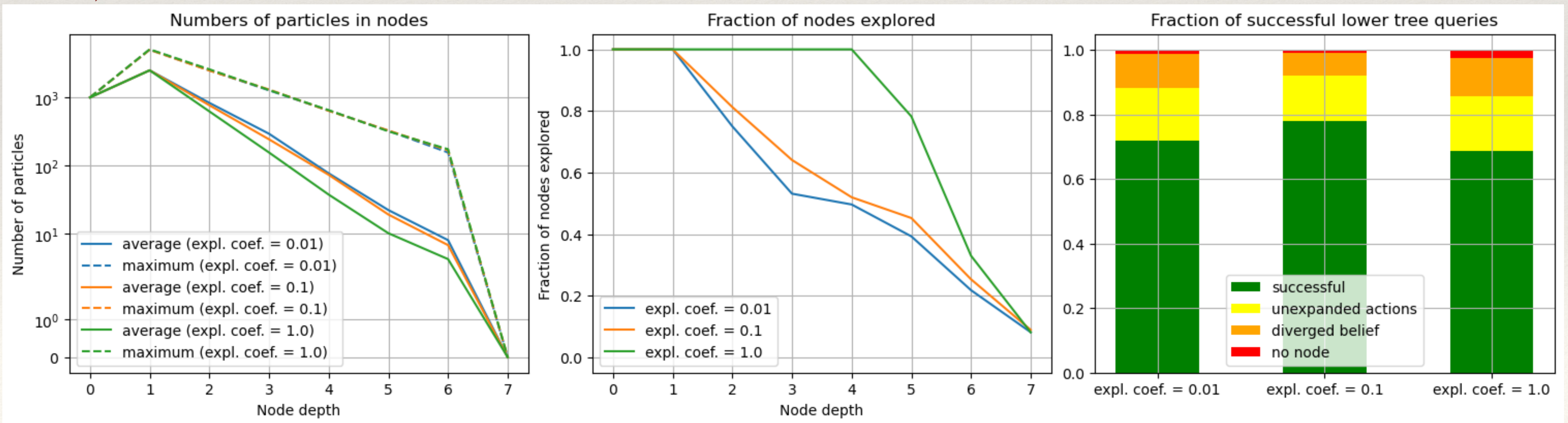# Choosing Solver Parameters

- one simulation
- two agents
- 10k samples
- reasoning level 1
- only first time step
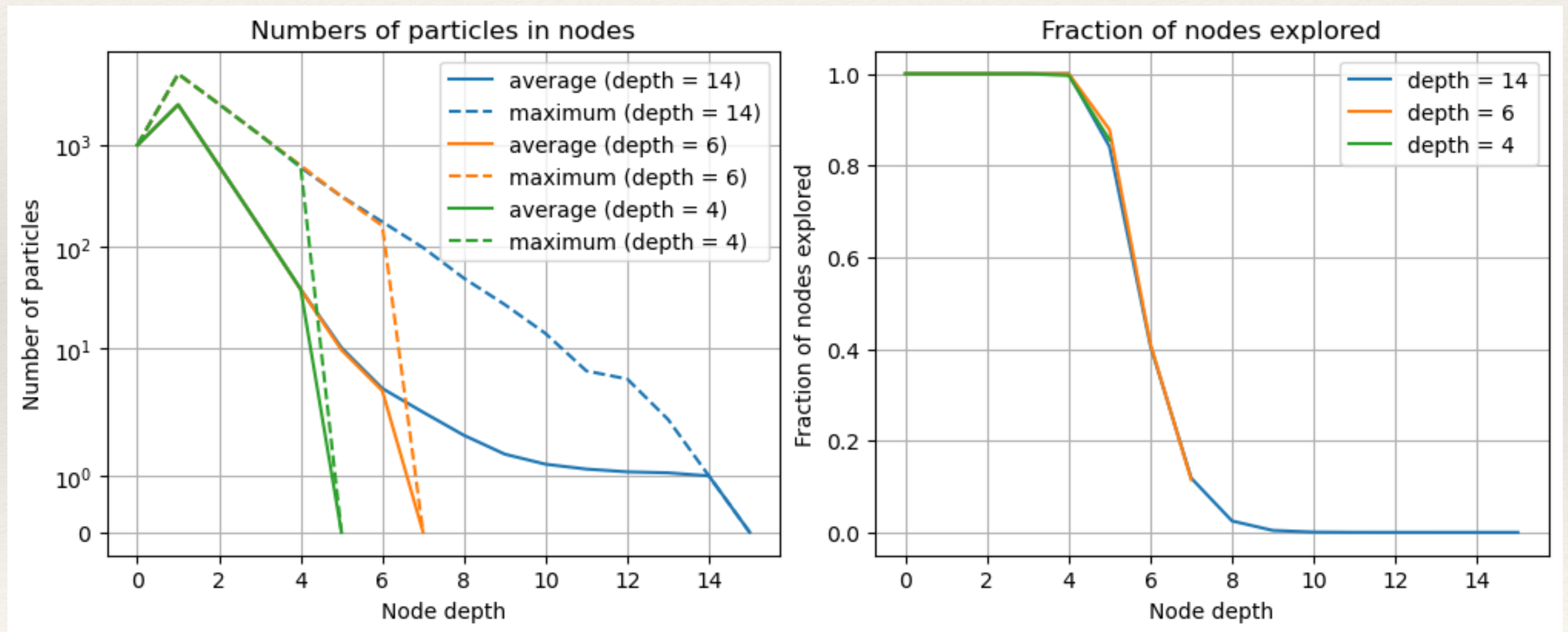- results from one agent's tree (plots 1 and 2 from level 0 tree, plot 3 from level 1 tree)

Exploration coefficient

Choosing Solver Parameters

- one simulation
- 10k samples
- reasoning level 0
- only first time step
- results from one agent's tree

Discount horizon depth

The Mismatch Issue

❖ what should an agent do when it predicted some action but observed another?

  ❖ this can cause the particle filter to diverge in the lower tree when simulating the tree above

❖ I-POMDP does not seem to have an answer: interactive states $is_{1,l} = (s, \theta_{2,l-1}, \ldots, \theta_{n,l-1})$ define an environment state and models for the behaviours of the other agents (= lower trees), but this is the only model they have

  ❖ no "trying to figure out what the others must have done instead"

❖ so: maybe just "embrace the confusion" and assume the agent in the lower tree behaves randomly

Other Progress

- Performance was worrying, so I did some work to speed up the code

    - around 70-80% faster now

- Paper: wrote sections on I-POMDPs and modelling the system as an I-POMDP, starting to write about the planning algorithm

- Wrote lots of tests for code

- Will apply for time on Snellius today

Schedule

Goal: graduate on time (before Aug 31)

Effect of summer holidays?

Proposed schedule:

- simulations: beginning of July

- Meeting with Mike in July (after 17th)

- (Internal) paper draft deadline: e.g. July 24

- Submitting paper: 2 weeks before defence, e.g. Aug 4

- Defence: before Aug 23, e.g. Aug 18

Notes from the Meeting

❖ for particle noise, try both Gaussian and uniform distributions

❖ extend n_agents plots: 10 agents, also add bar plot

❖ investigate the lines "crossing over" in the n_agents plot

❖ exploration coefficient: choose value based on where convergence happens based on some objective. Maybe fix at 1.0, no need to do SA on it

❖ search depth: value between 4 and 6 (maybe preferably 4), need to do SA (up to 4)

❖ brand the mismatch issue as "bounded rationality" — it is natural that agents predict some action but something else happens instead

    ❖ try to quantify the extent of mismatch: calculate frequencies in each tree

❖ make a better bar plot: multiple runs, different numbers of agents, confidence intervals

❖ estimate compute time for simulations, including how it scales with the number of agents

❖ in paper: make a simple diagram of the algorithm with two agents, two actions, draw out a few steps

❖ important to do global SA, will take time

❖ next meeting: July 19, noon-1pm

    ❖ finish methods section before this, send Overleaf