Language-conditioned Tasks

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  - NL2Action+Argument (instruction following)

Room-to-room dataset

Anderson el at + 2017

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Task: Given some natural language instructions, navigate the agent through the environment and reach the goal location

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Leave the bedroom, and enter the kitchen. Walk forward, and take a left at the couch. Stop in front of the window.

Anderson el at + 2017

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ALFRED datase

Shridhar el at + 2020

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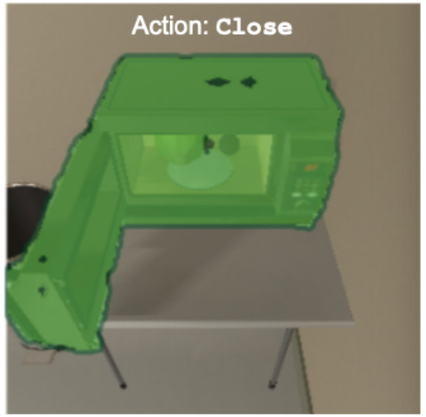

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Goal Instruction	Put a microwaved tomato in the sink.
Step-by-Step Instructions	Turn around and go to the left side of the sink. Pick up the tomato in the front. Turn right to go to the microwave on the left. Microwave the tomato next to coffee mug and take it out. Turn left to go back to the sink. Place the tomato inside the sink.

Shridhar el at + 2020

Sequence to sequence model w/ Attention

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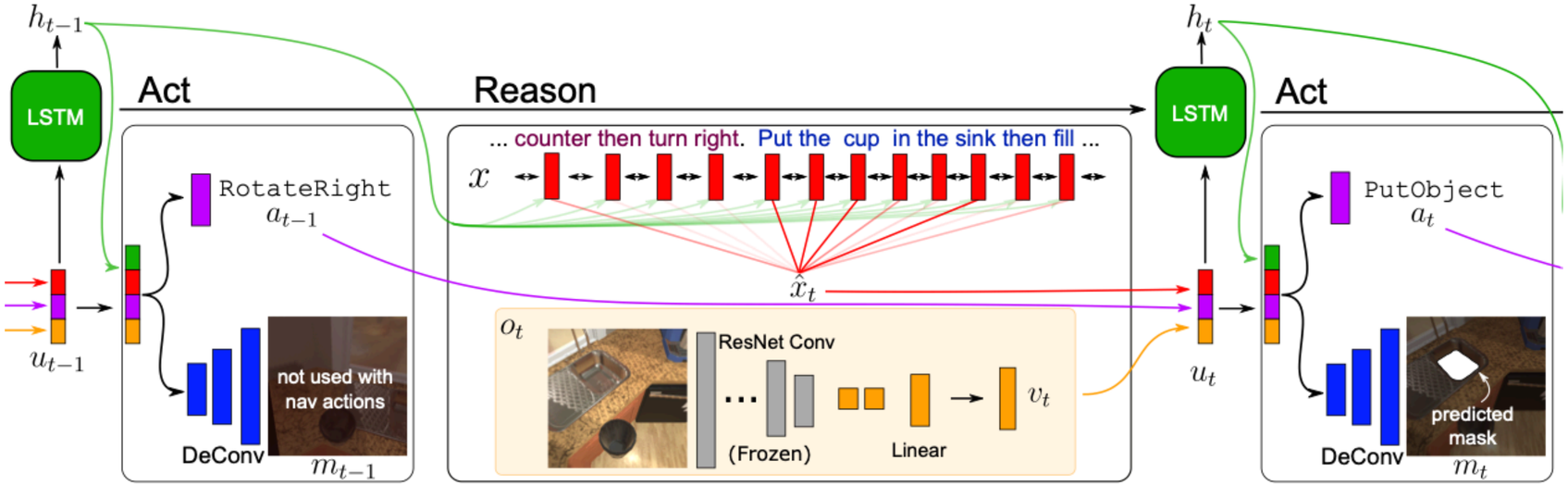

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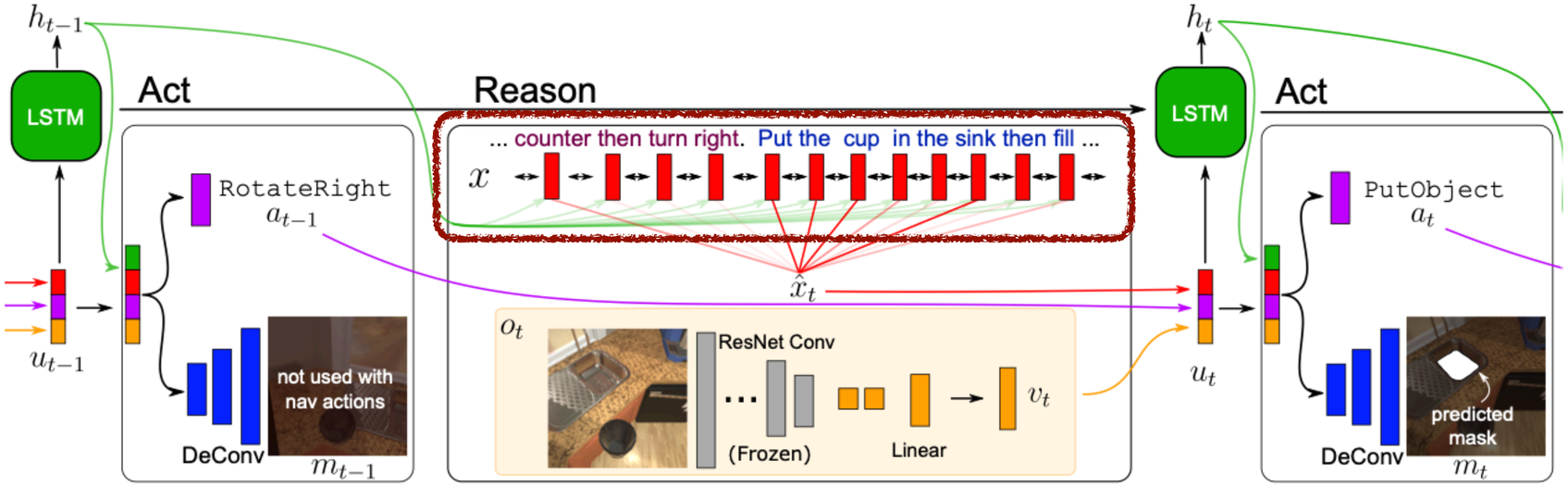
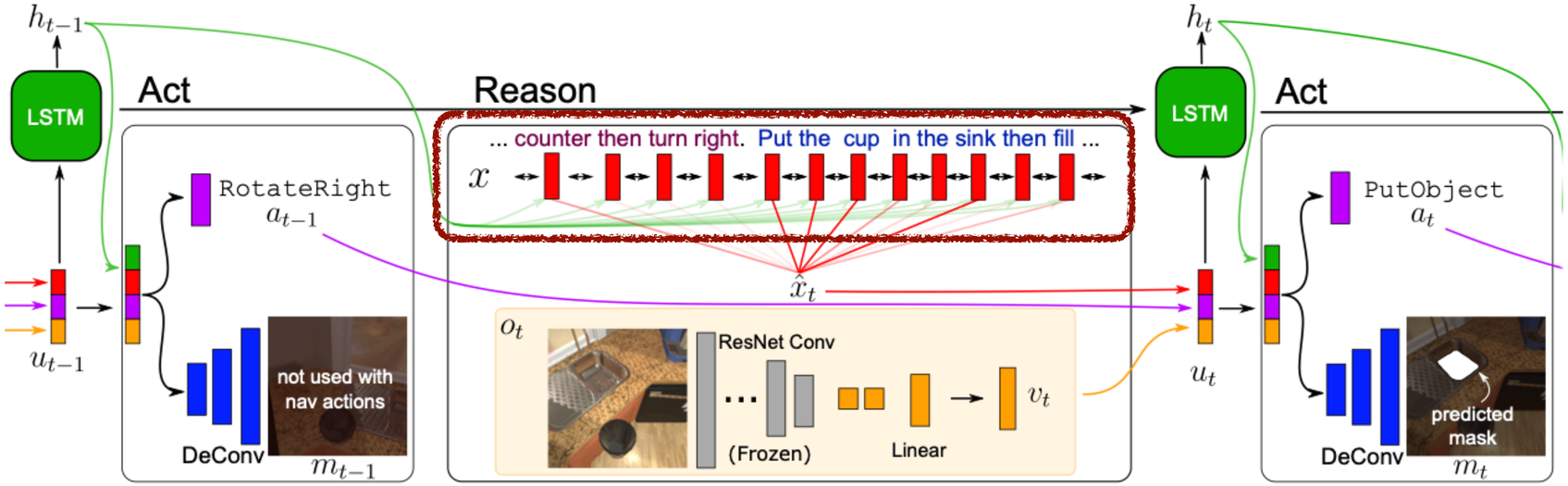


- The encoder encodes the NL instruction

Sequence to sequence model w/ Attention



- The encoder encodes the NL instruction
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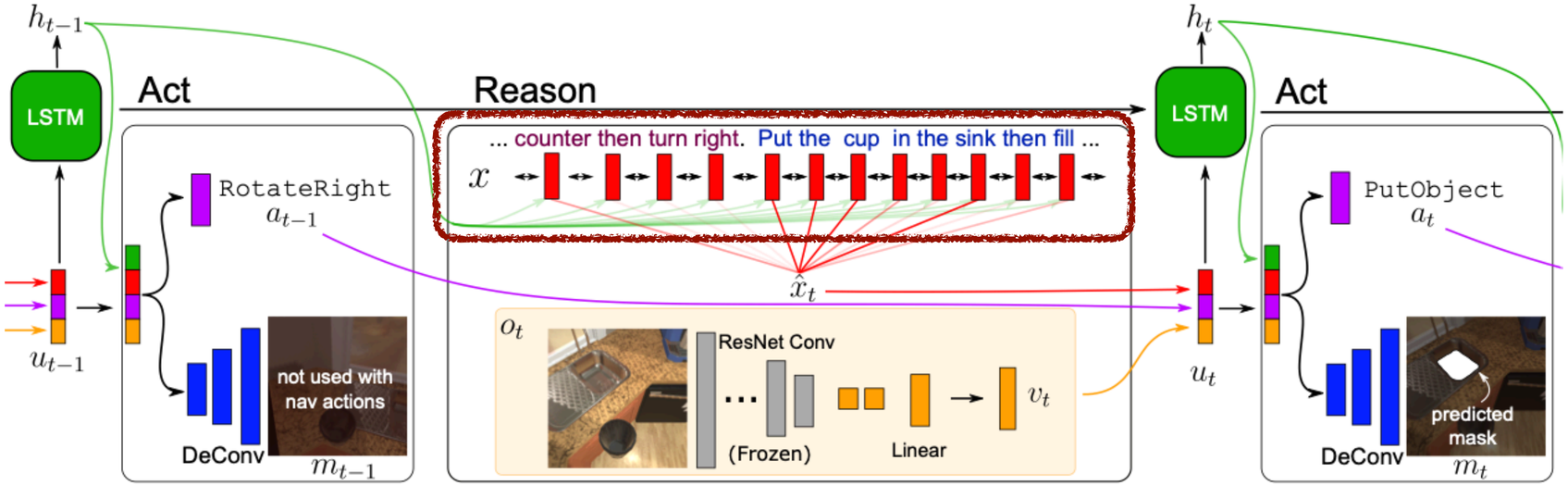

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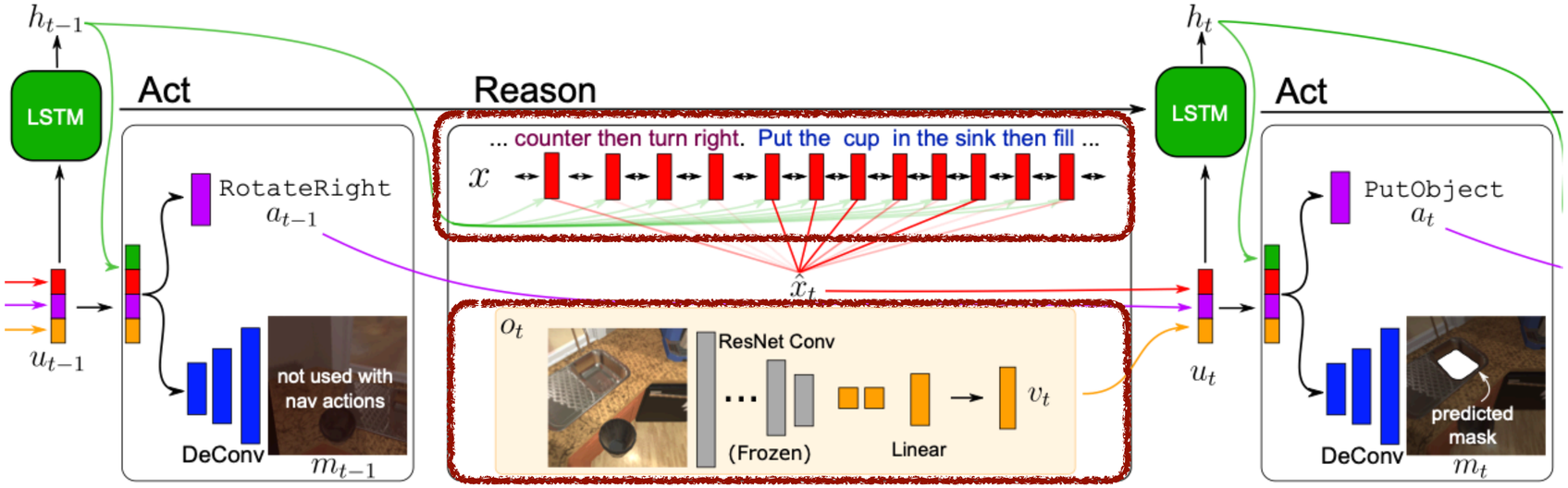

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  - Current state (e.g. visual information)

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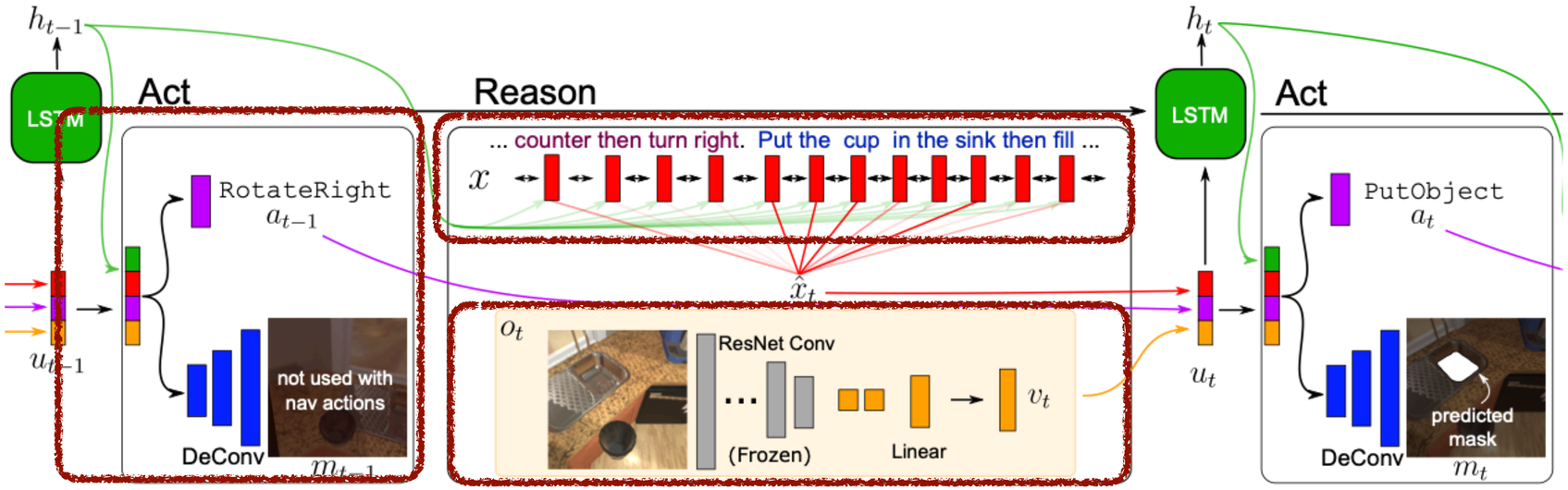

- The encoder encodes the NL instruction
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  - Current state (e.g. visual information)
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Speak-follower Model

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Language is often under-specified, it is challenging to learn the mapping between NL and actions from a limited amount of annotations

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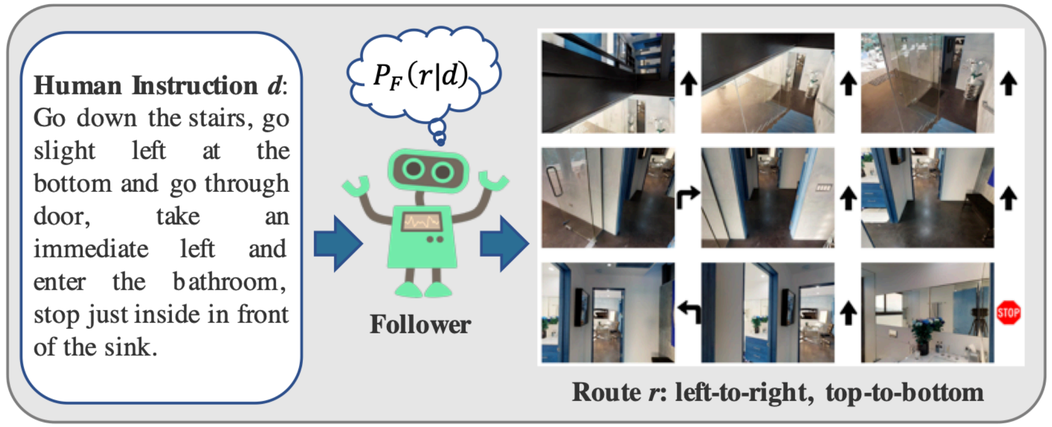

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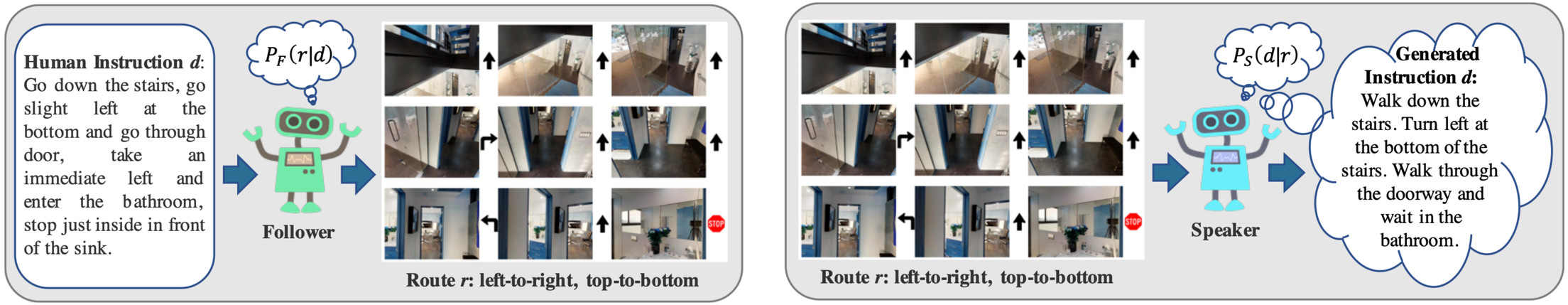

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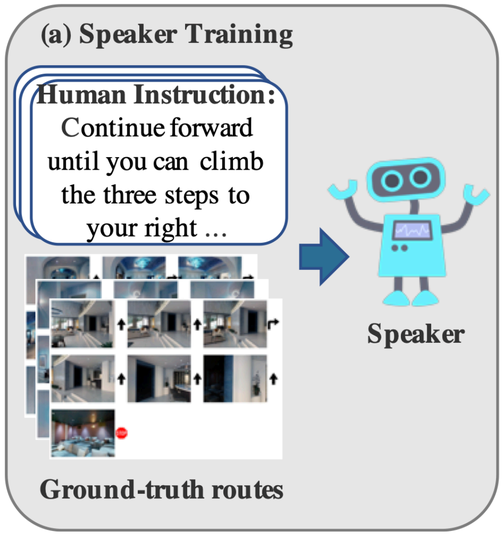

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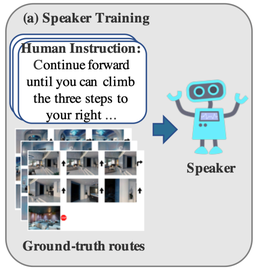

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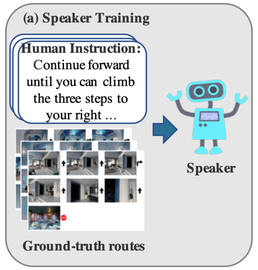

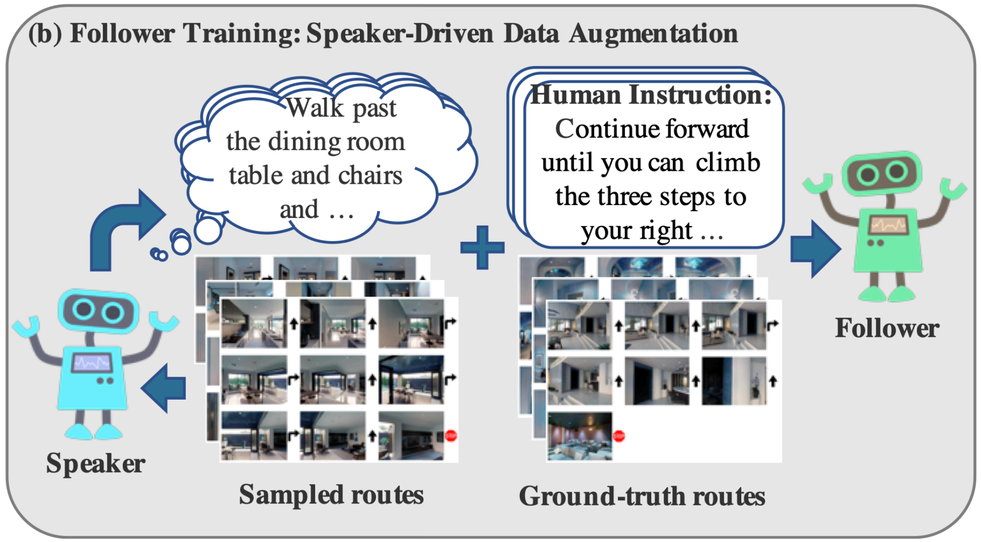

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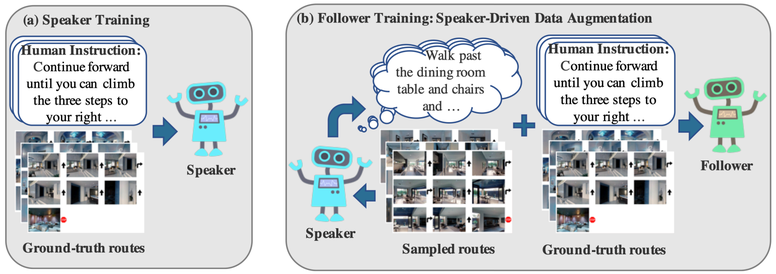

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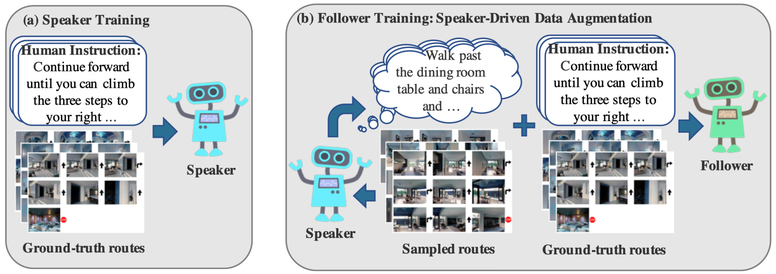

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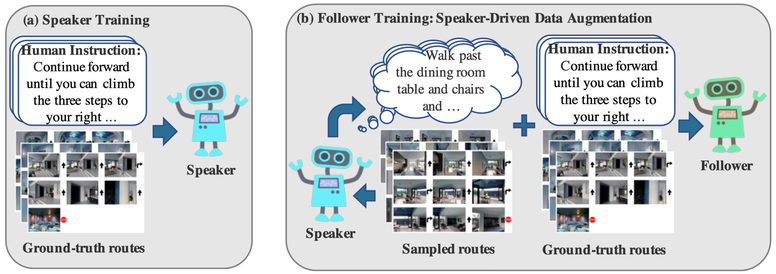
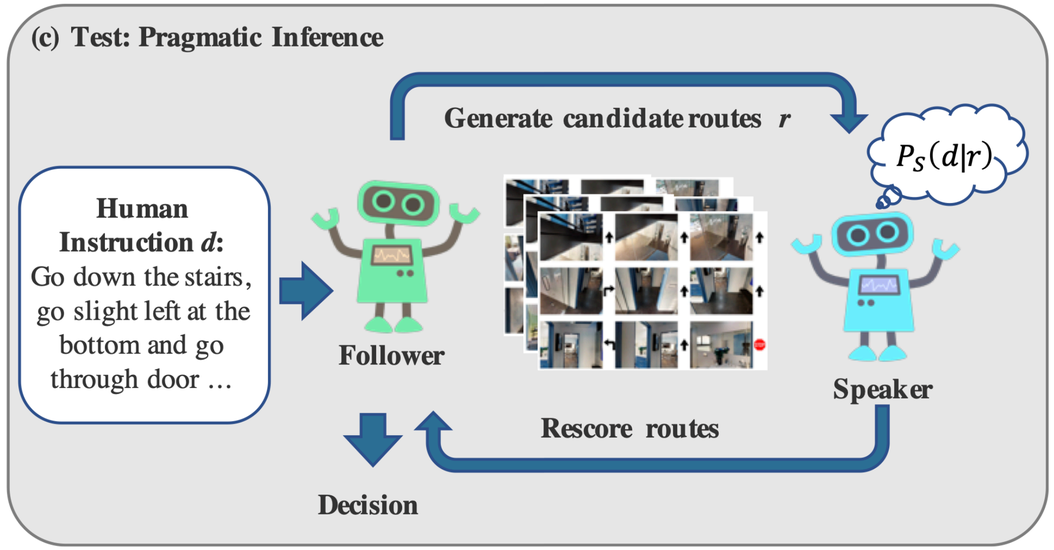
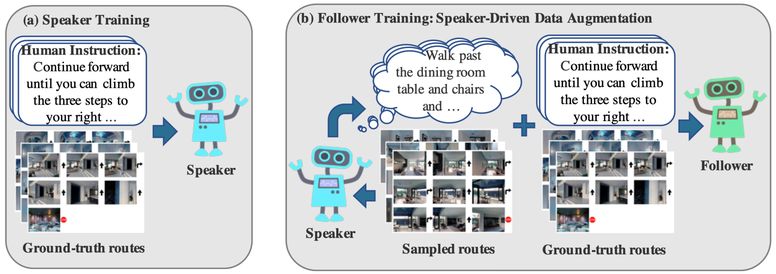
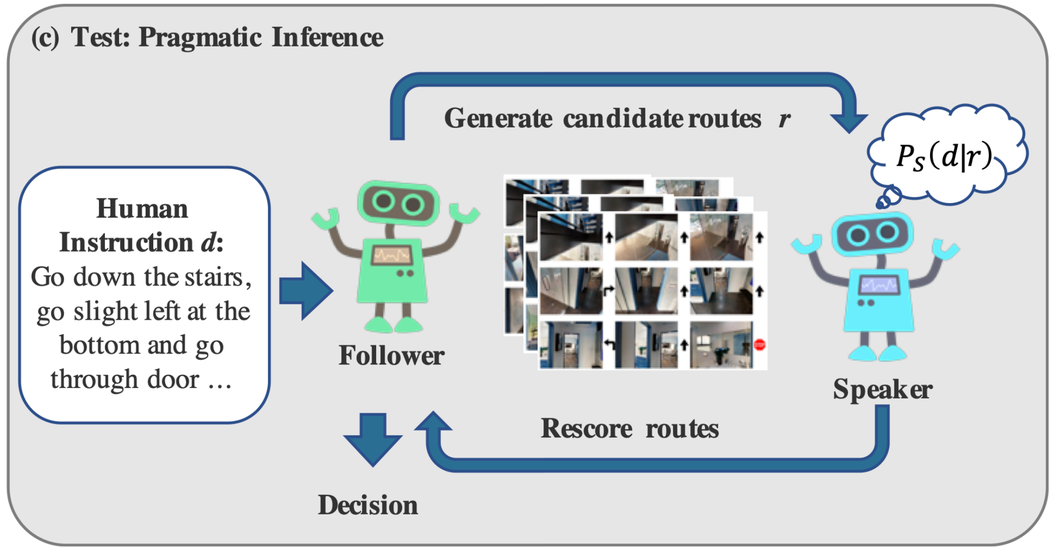




- Data augmentation

Speak-follower Model





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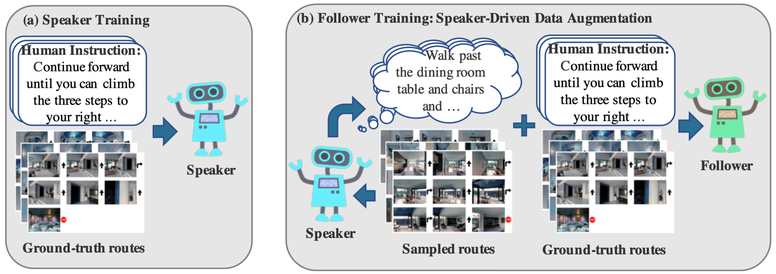

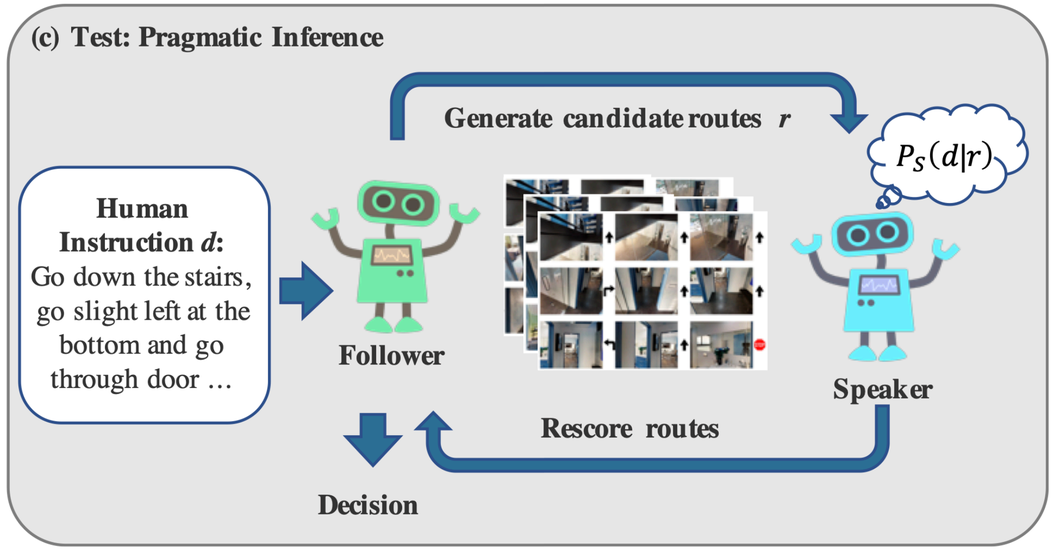

- Data augmentation
- Consistency enforcement between the natural language and actions
- Search can be expensive in real-world deployments

Evaluation

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- SPL (Success weighted by path/action sequence length)

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    - Measure the consistency with the reference path

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  - Measure the consistency with the reference path
- Task (sub-task) success rate
  - Compare state’ with state*

Other Tasks

- Mobile phone operations
  - Pixel Help (Li el at + 2020)
- Web application operations
  - Russ (Xu el at + 2020)
- Windows/Linux system operations
  - UbuntuWorld (Chakraborti el at + 2016)
  - Windows (Branavan el at + 2010)

Language-assisted Tasks

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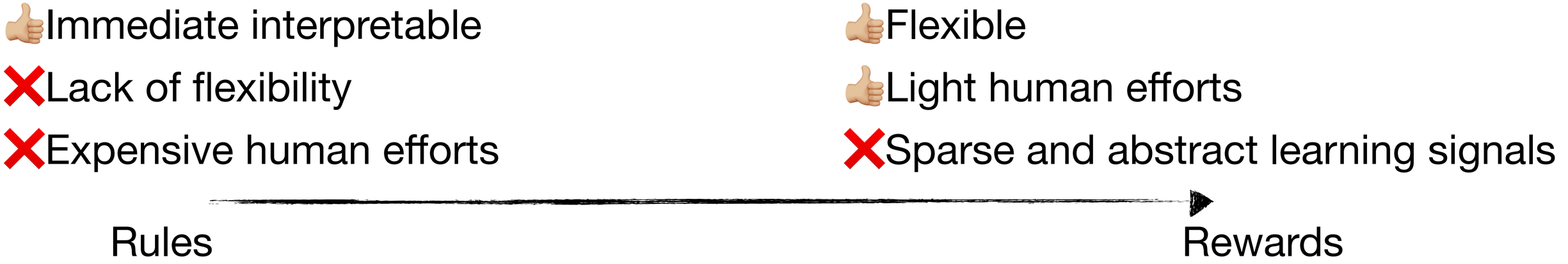

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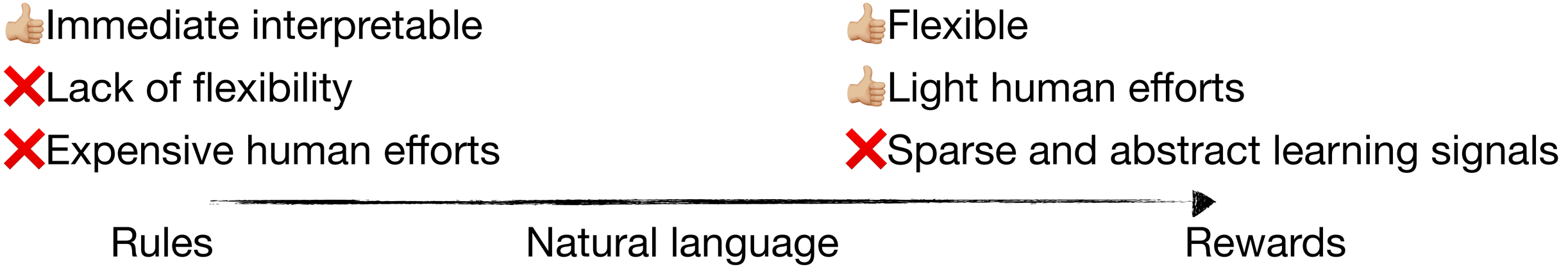

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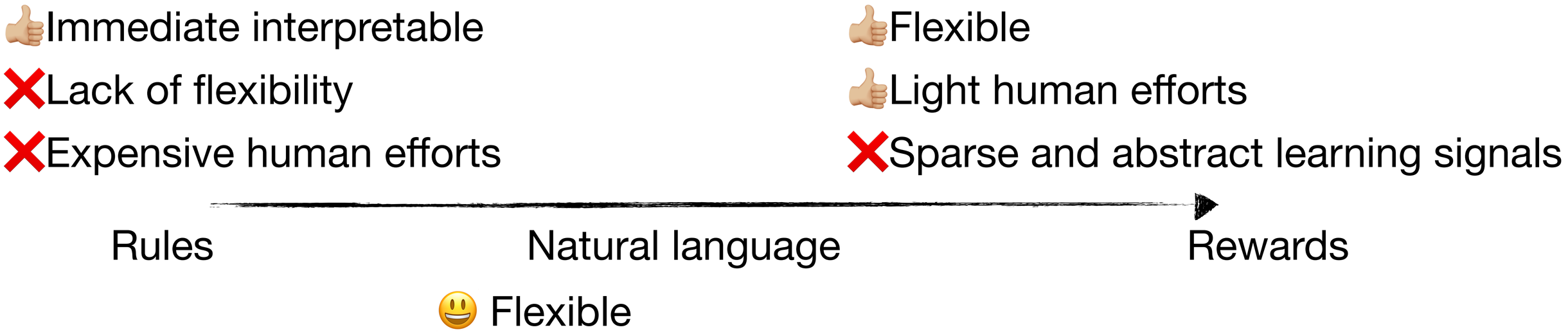

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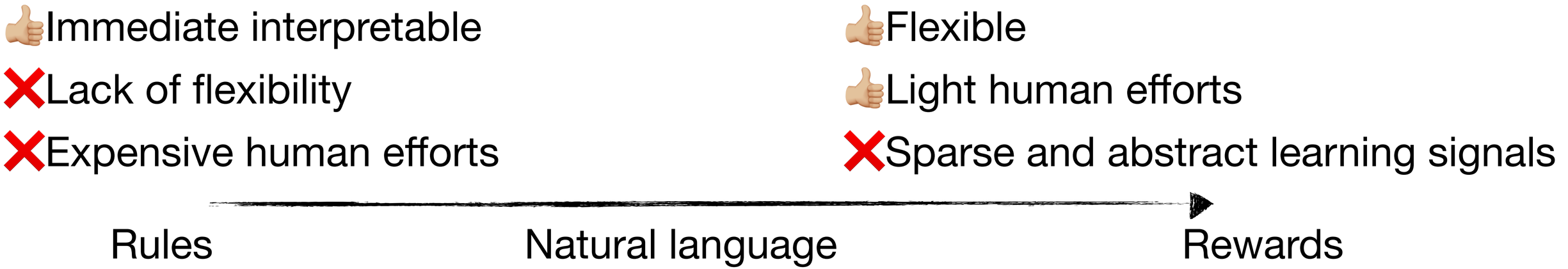

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👍Flexible
👍Light human efforts
❌Sparse and abstract learning signals

Rules

Natural language

😃 Flexible
😃 Manageable human efforts
😃 Richer learning signals

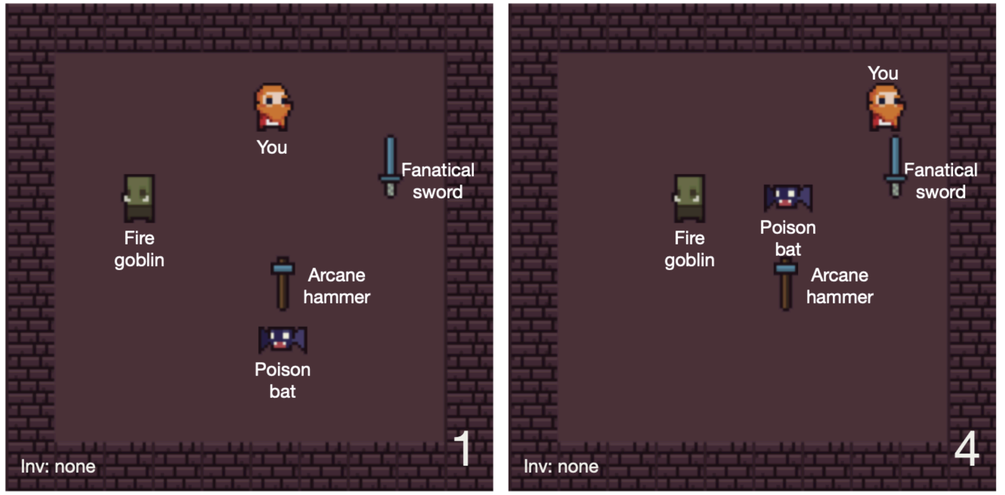
Rewards

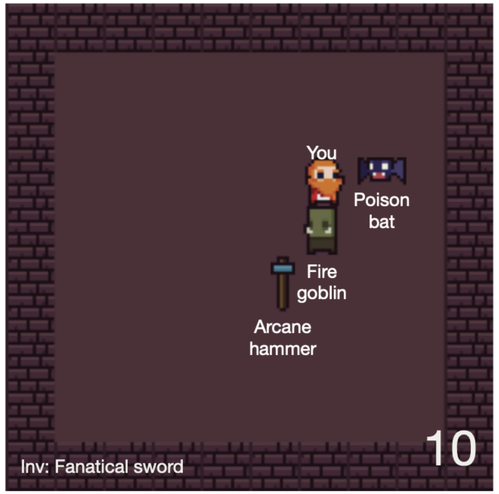
Communicate the Structured Policies

RTFM, Zhong el at + 2019

Communicate the Structured Policies

Doc:
The Rebel Enclave consists of jackal, spider, and warg. Arcane, blessed items are useful for poison monsters. Star Alliance contains bat, panther, and wolf. Goblin, jaguar, and lynx are on the same team - they are in the Order of the Forest. Gleaming and mysterious weapons beat cold monsters. Lightning monsters are weak against Grandmaster's and Soldier's weapons. Fire monsters are defeated by fanatical and shimmering weapons.
Goal:
Defeat the Order of the Forest





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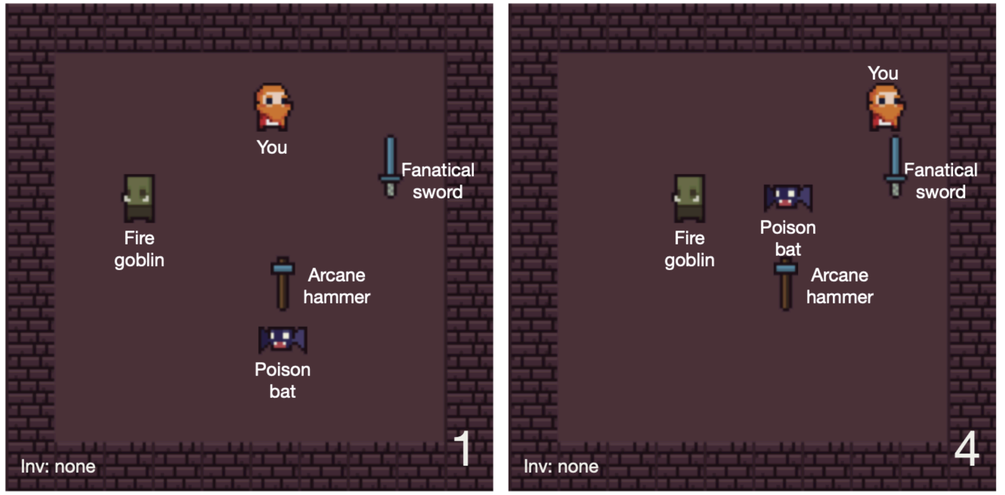

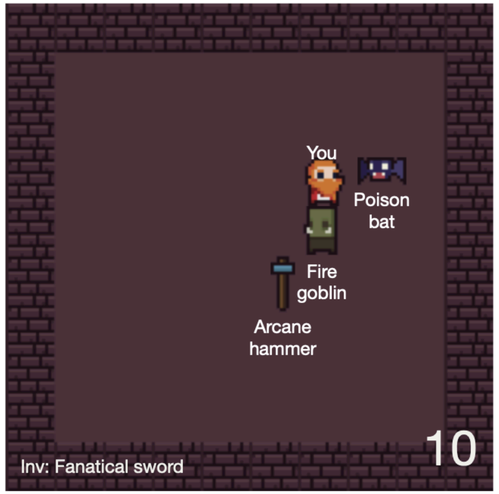

- The targeted team and their members
- Effectiveness of the modifiers and weapons
- …..

RTFM, Zhong el at + 2019

Model: Fusion of State and Text

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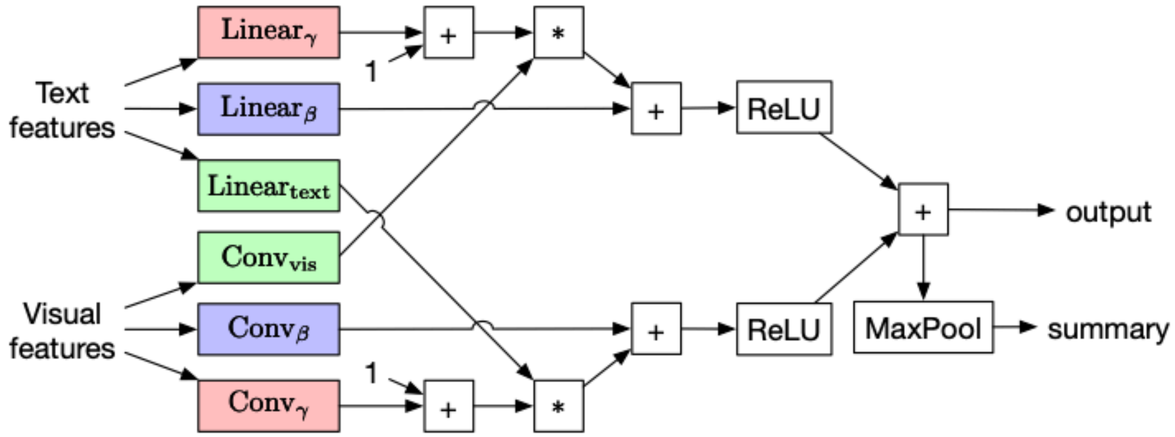

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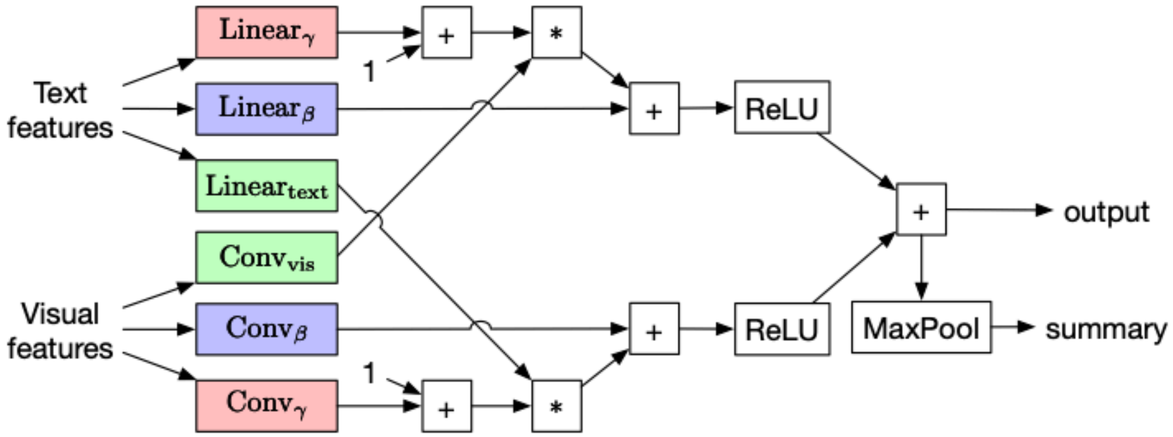

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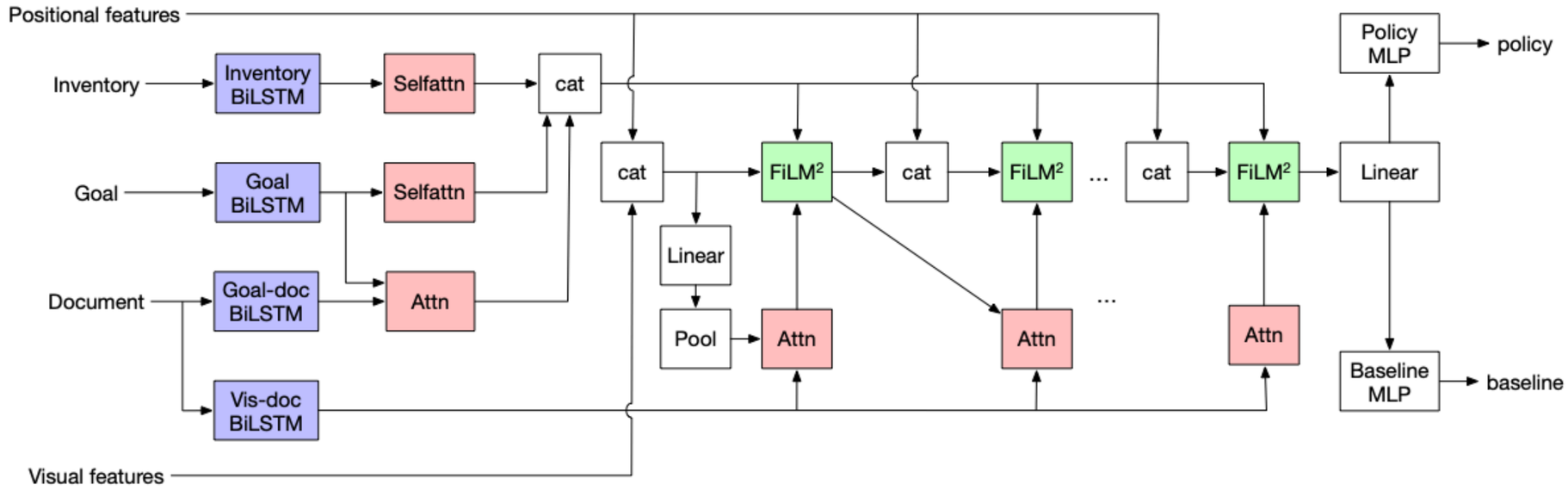

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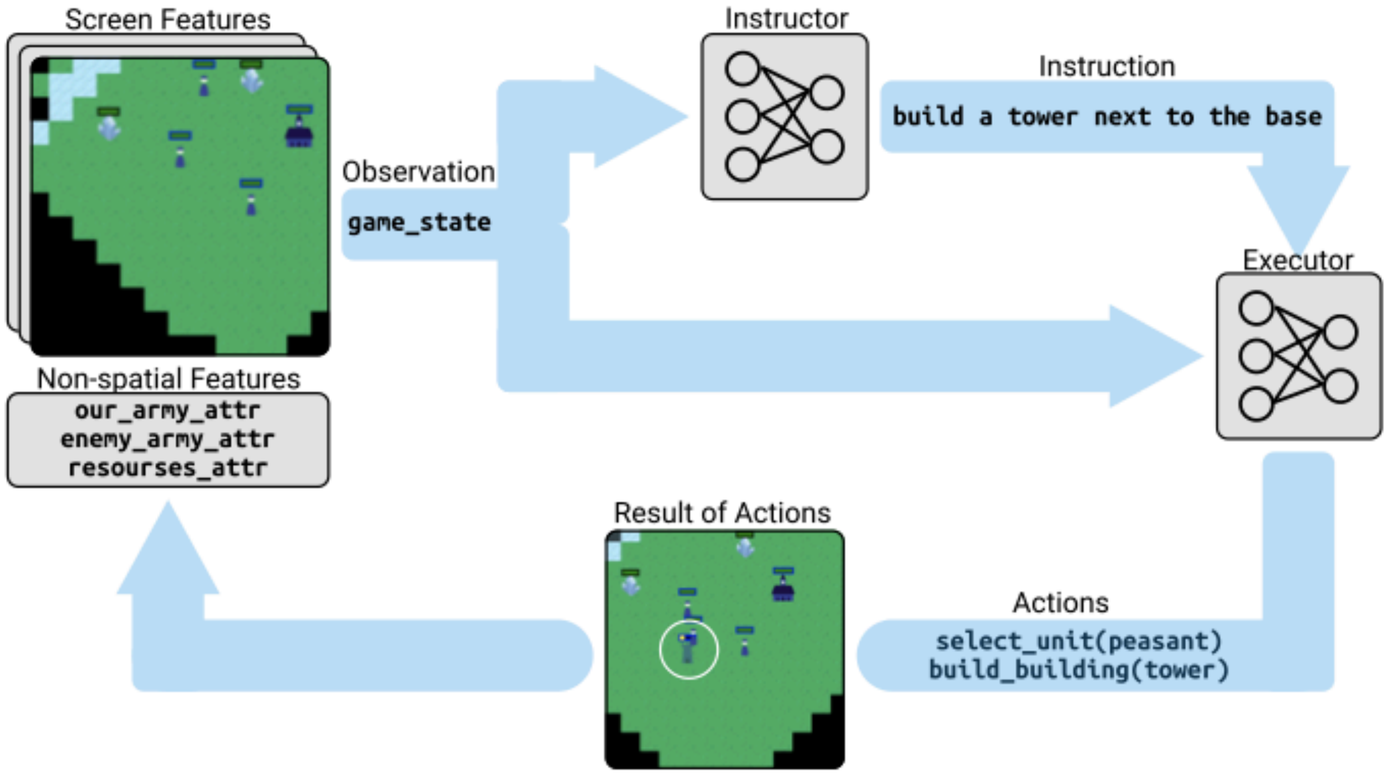
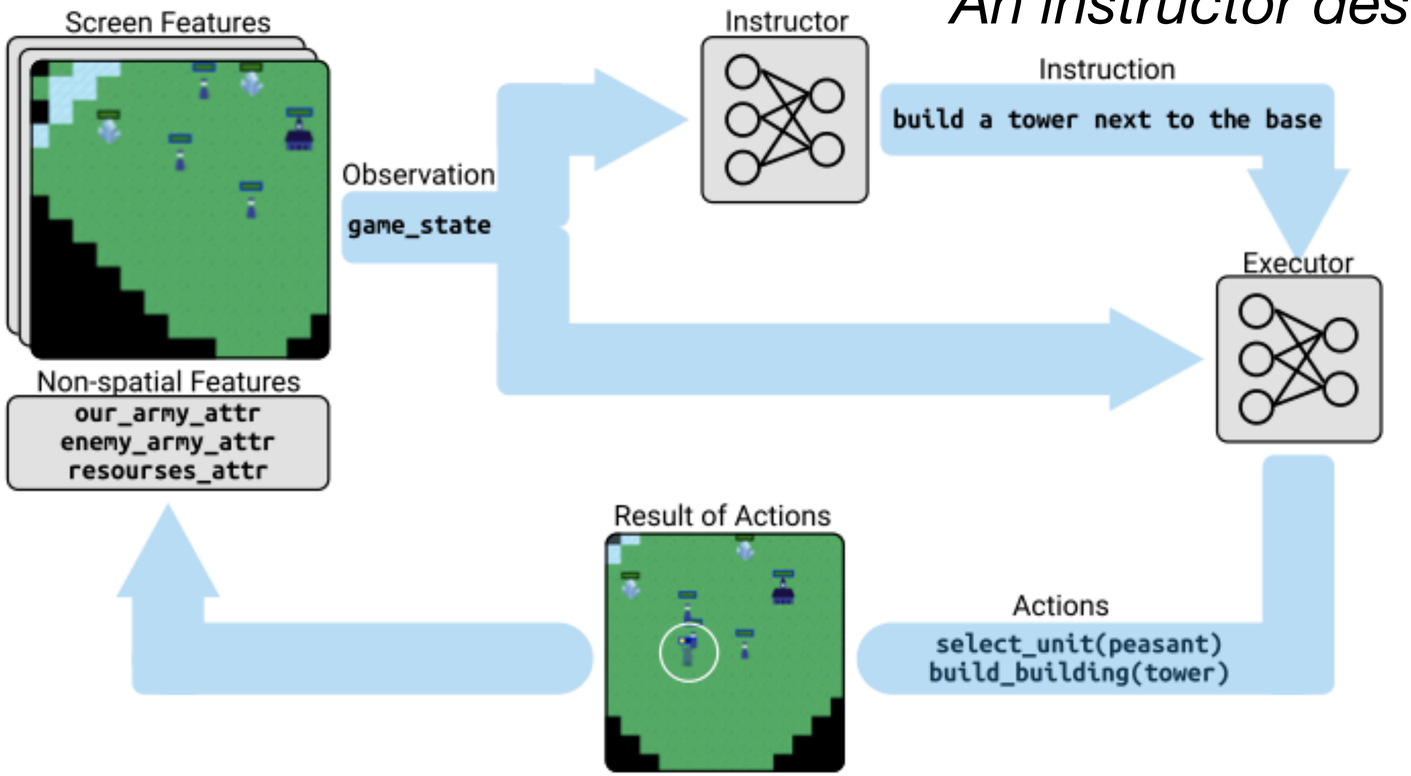


Hu el at + 2019

Communicate the Structured Policies

An instructor describes what to do next



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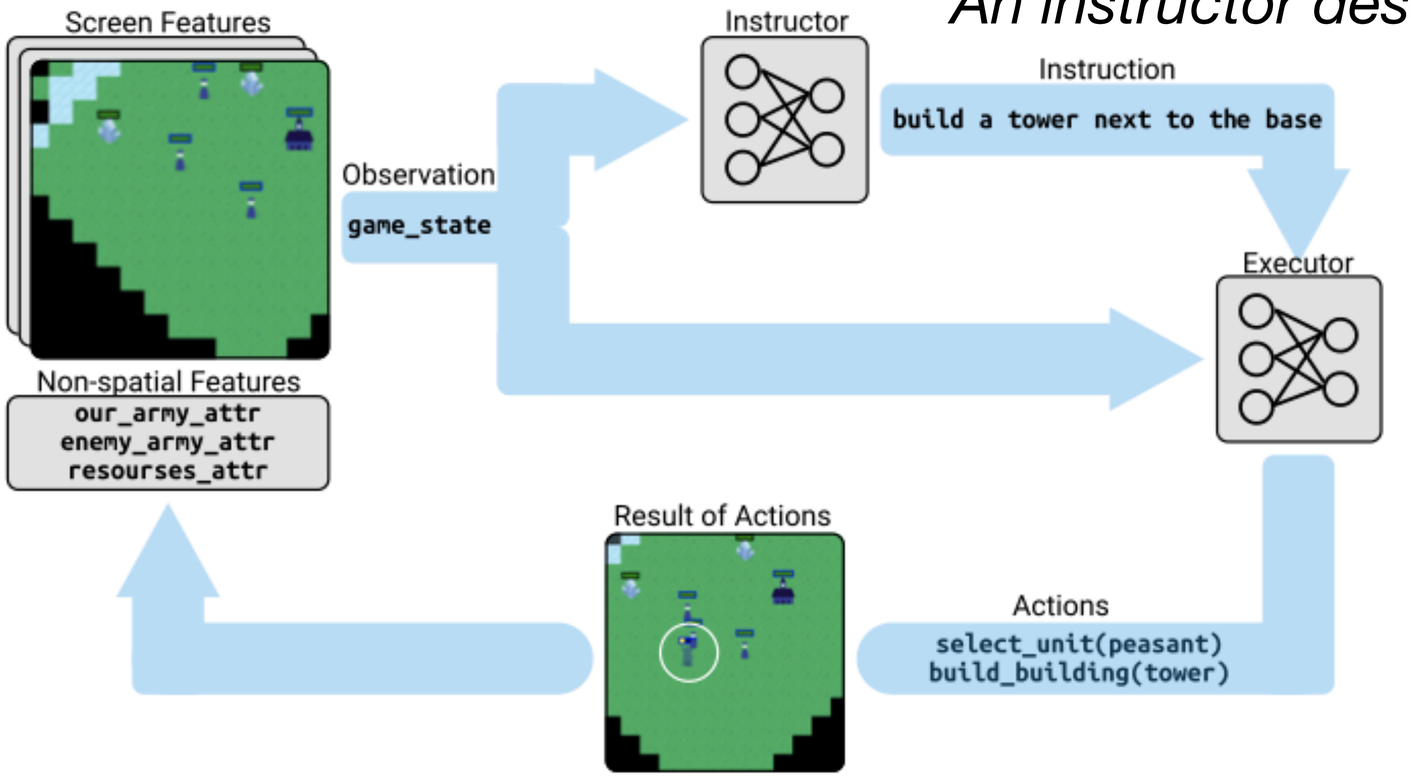
Communicate the Structured Policies



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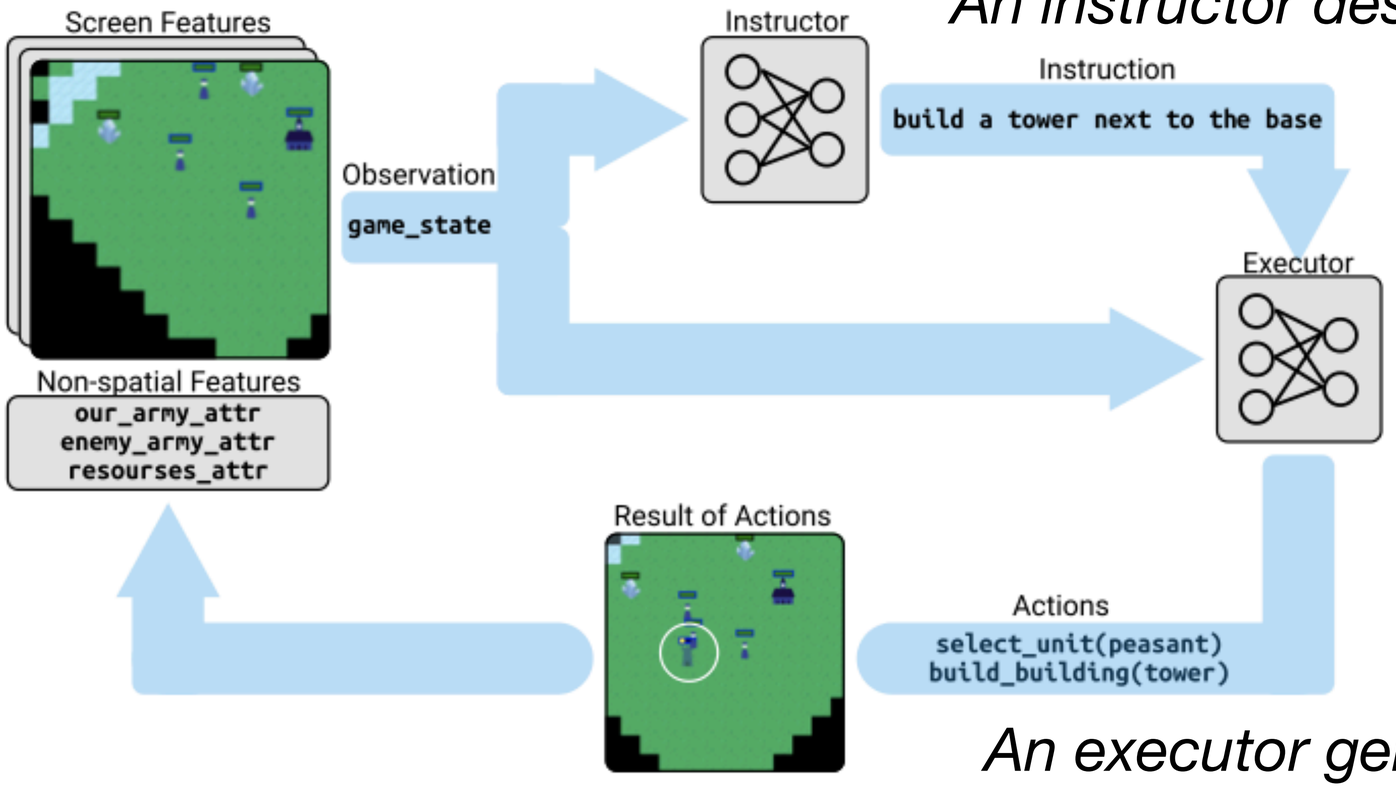
Flexible in granularity

Hu el at + 2019

Communicate the Structured Policies



An instructor describes what to do next

Flexible in granularity

An executor generates actions based on NL + state

Hu el at + 2019

Leverage Task-independent Text

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