Learning with Language-Guided State Abstractions

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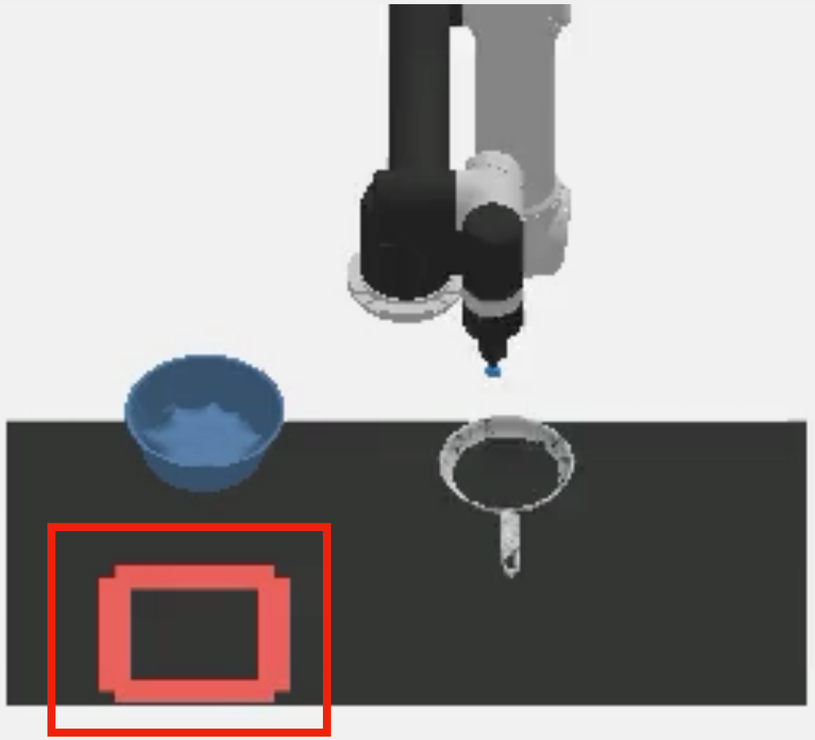


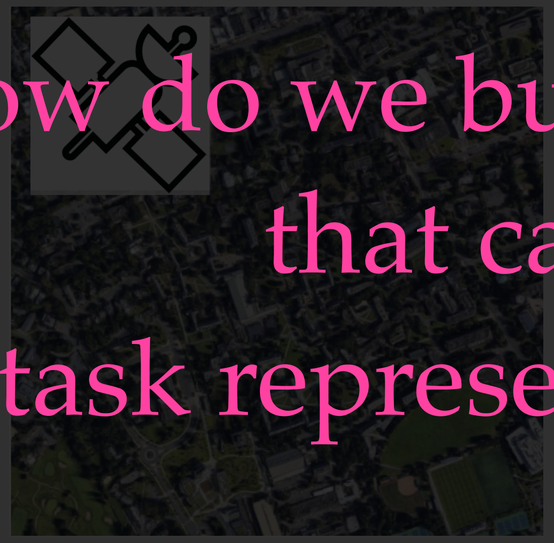
Grabbing a pan?

Grabbing a metal object?

Putting any object on the stove?

Cooking

Humans plan using **state abstractions**



How do we build autonomous agents that can reason about task representations in this way?

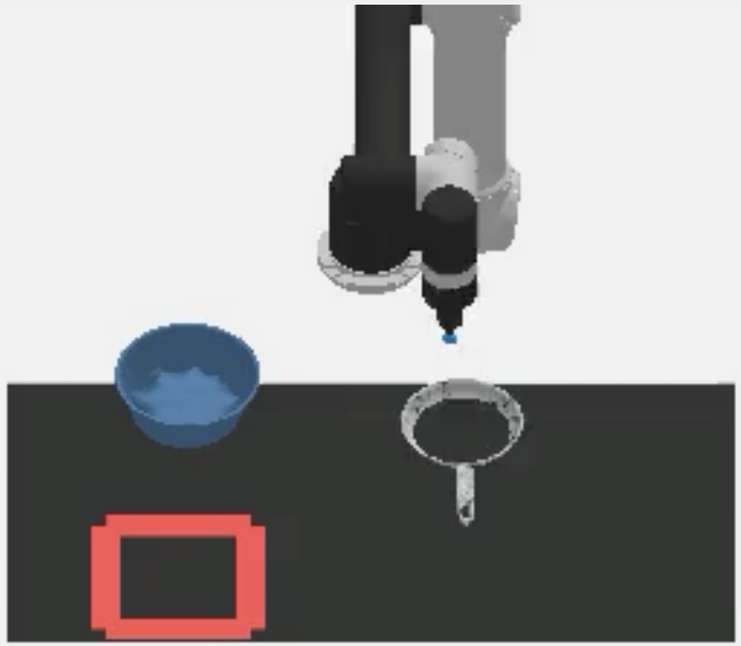
People construct simplified mental representations to plan, Ho et al., *Nature* 2022.

Key Insight

Language serves as a natural semantic prior to help construct *abstractions*.

How do we do this?

Idea: Query language models for task-relevant features



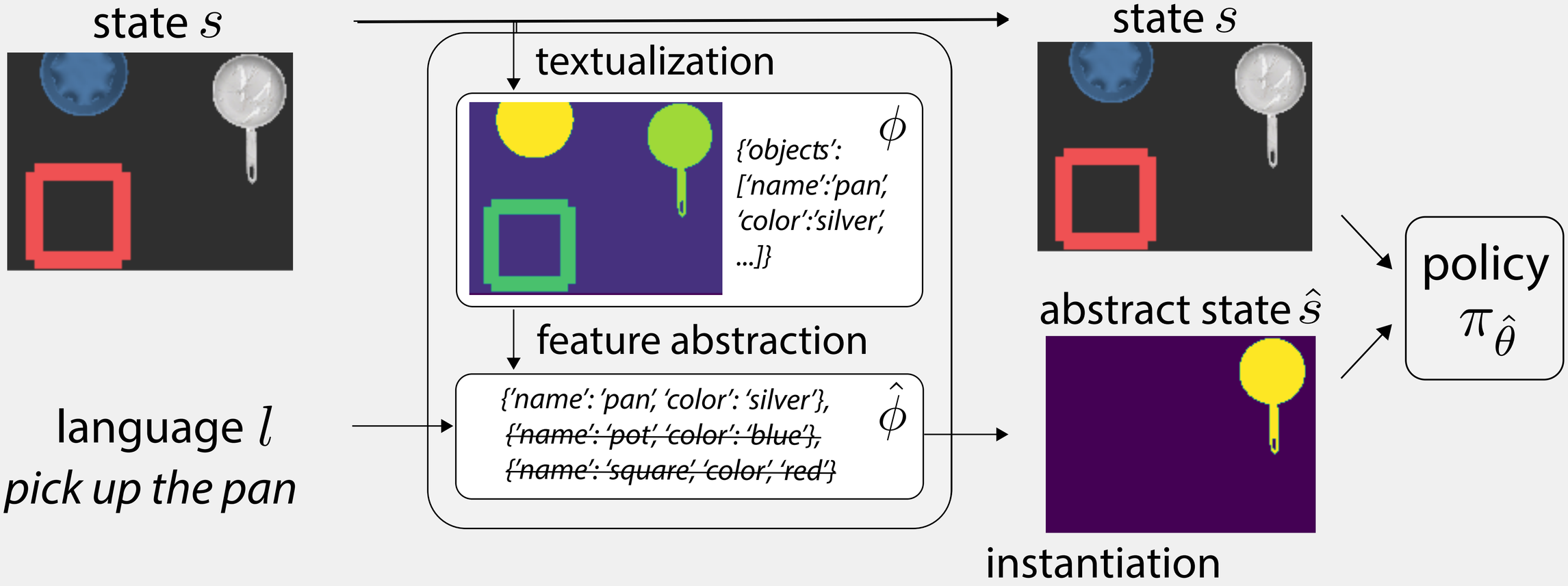
Pick up the pan

Q: Is *color* of the pan important to the task?

Q: Is the object being a *pan* important to the task?

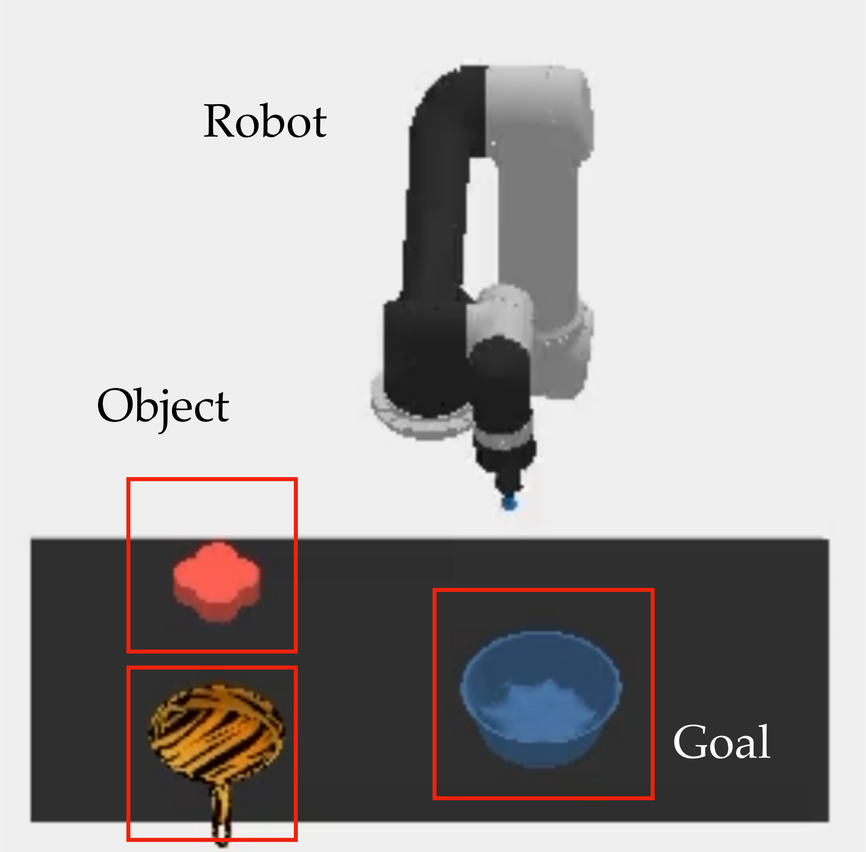
Q: Is the *bowl* important to the task?

LGA: Language-Guided Abstraction



state abstraction $\hat{f} : \mathcal{S} \times L \rightarrow \hat{\mathcal{S}}$

We evaluate on different tasks in VIMA

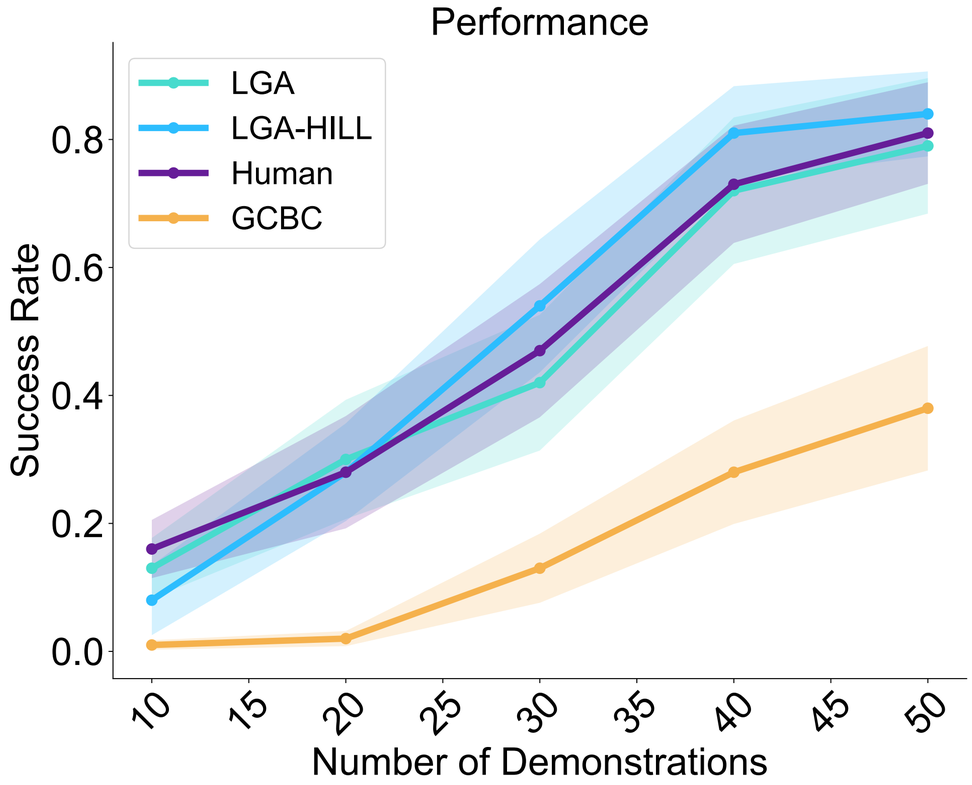


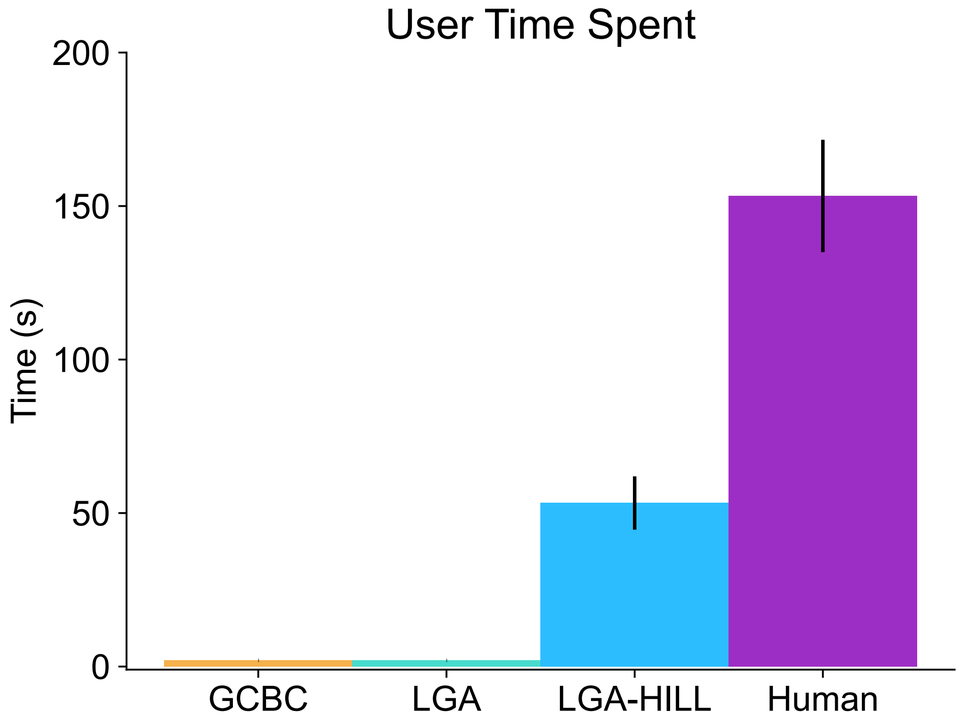
Pick up the pan

Pick up the the red pan

Pick up something to drink from

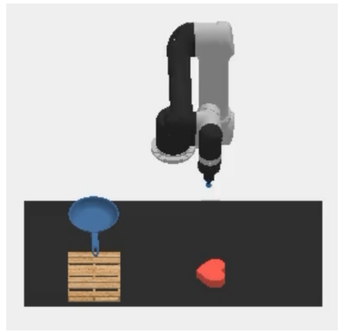
Does LGA construct good state abstractions?



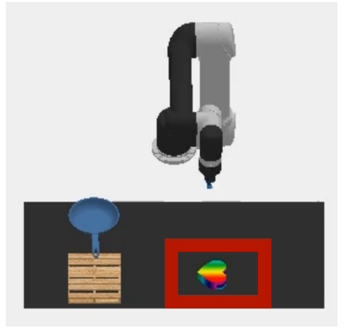


LGA outperforms naive BC on task performance while significantly reducing user time spent compared to manual feature specification ($p<0.001$).

Does LGA improve policy robustness?



Bring me the heart.



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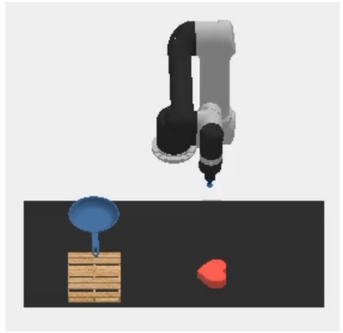

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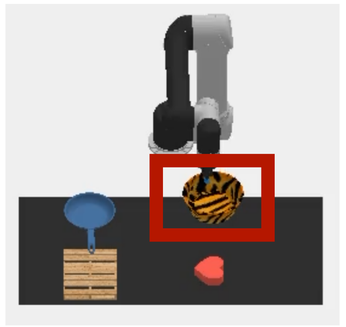
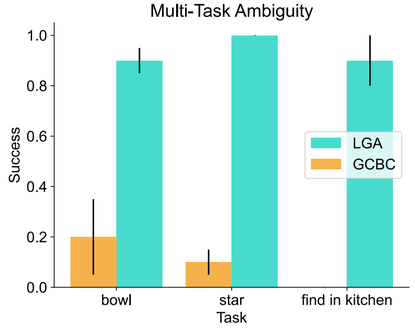


Bring me the heart.

Bring me the bowl.

Bring me something I can find in a typical kitchen.



LGA is more robust to 1) state covariate shifts and 2) linguistic ambiguity.

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