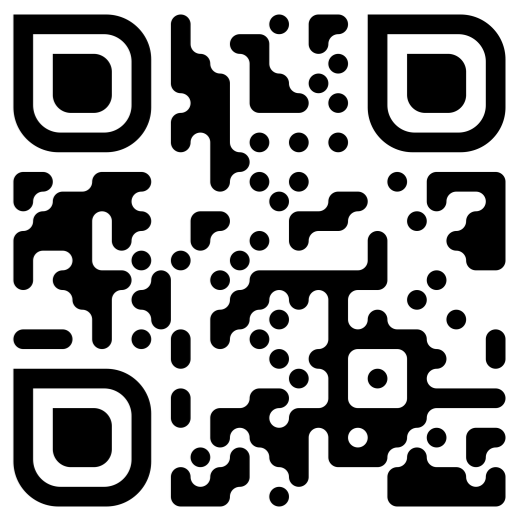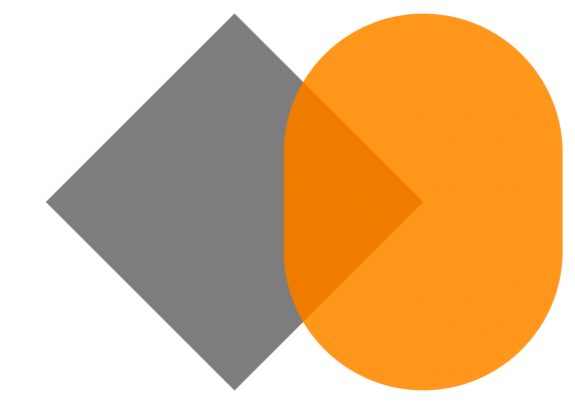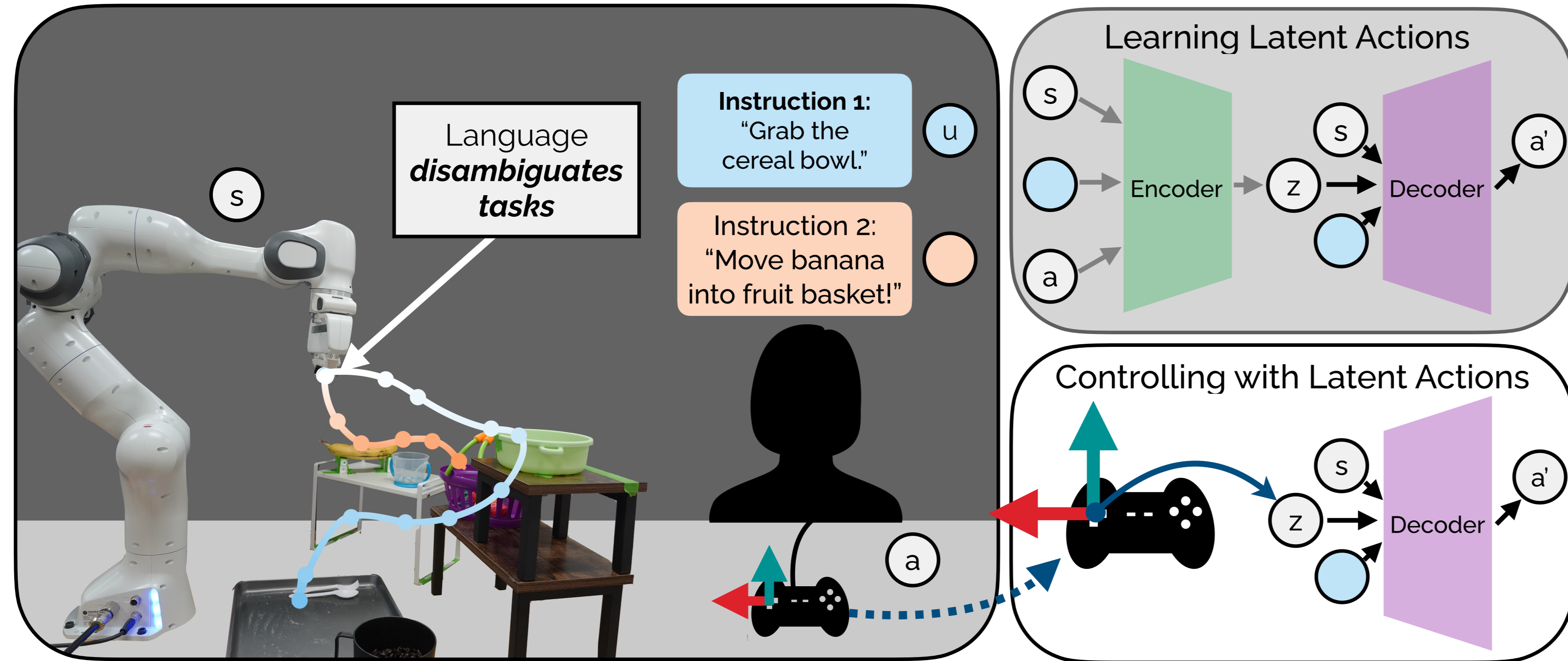# LILA: Language Informed Latent Actions

**Siddharth Karamcheti*, Megha Srivastava*, Percy Liang, Dorsa Sadigh**

Latent Actions: Low-dimensional, task aware controllers for high-dimensional robots under shared autonomy.

Problem: Disambiguation in multi-task environments; *can natural language help modulate low-dimensional control?*


Language *disambiguates tasks*

Instruction 1: "Grab the cereal bowl."

Instruction 2: "Move banana into fruit basket!"

Learning Latent Actions

Controlling with Latent Actions

Disambiguation

T1   T2

T4   T3

1 DoF

Multi-Task Training Demonstrations

Standard Latent Actions

"Higher"

T1   T2

T4   T3

"Lower"

Language-Informed Latent Actions

LILA Decoder

$\mapsto a'$

$+ \beta$

$h \times \gamma$

z

Training Exemplars

"Put the banana away"
"Pick up the bowl"

Distil-RoBERTa *w/ Mean Pooling*

Sim. Search

Distil-RoBERTa *w/ Mean Pooling*

"Grab the cereal bowl"

User Study: Successful task completion and user-preferred control with *15 demonstrations!*

End-Effector Control   Imitation Learning   LILA
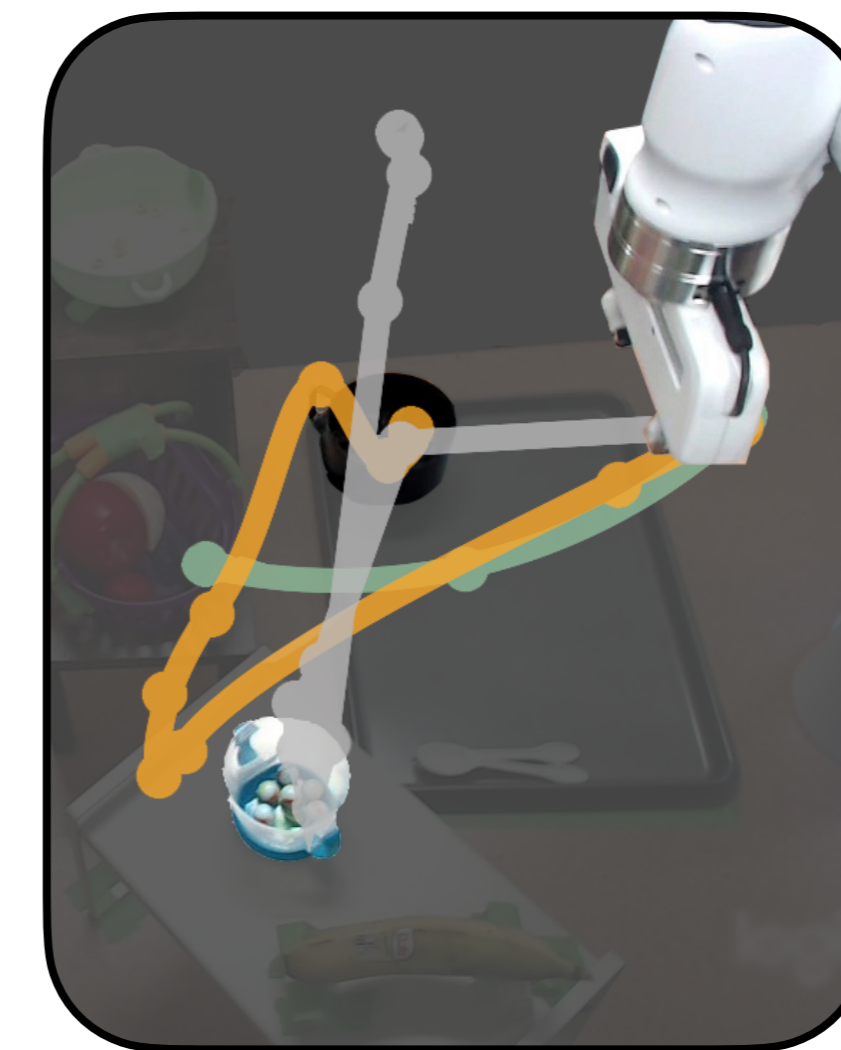
pour cup

"pour the cup with blue handles into the black cup"
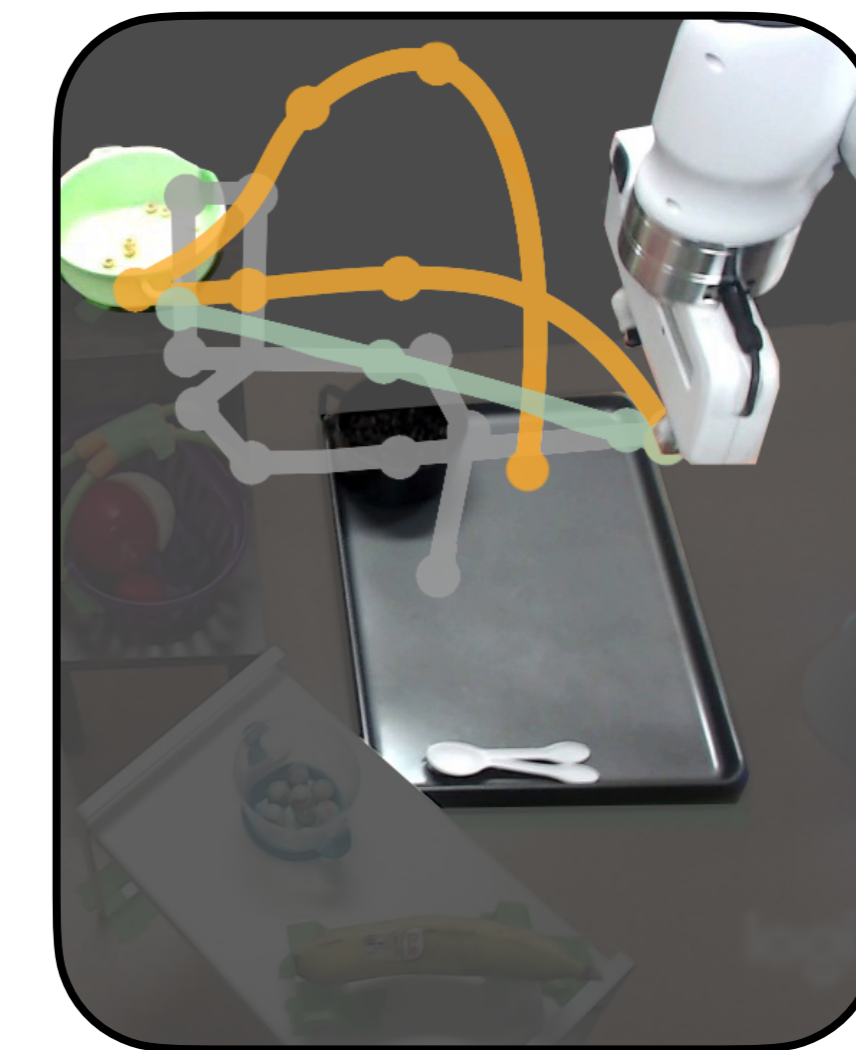
pick cereal

"grab the cereal bowl and put it on the tray"

pick banana

"put the banana into the basket"

Obtains 2x the success rate of baselines!