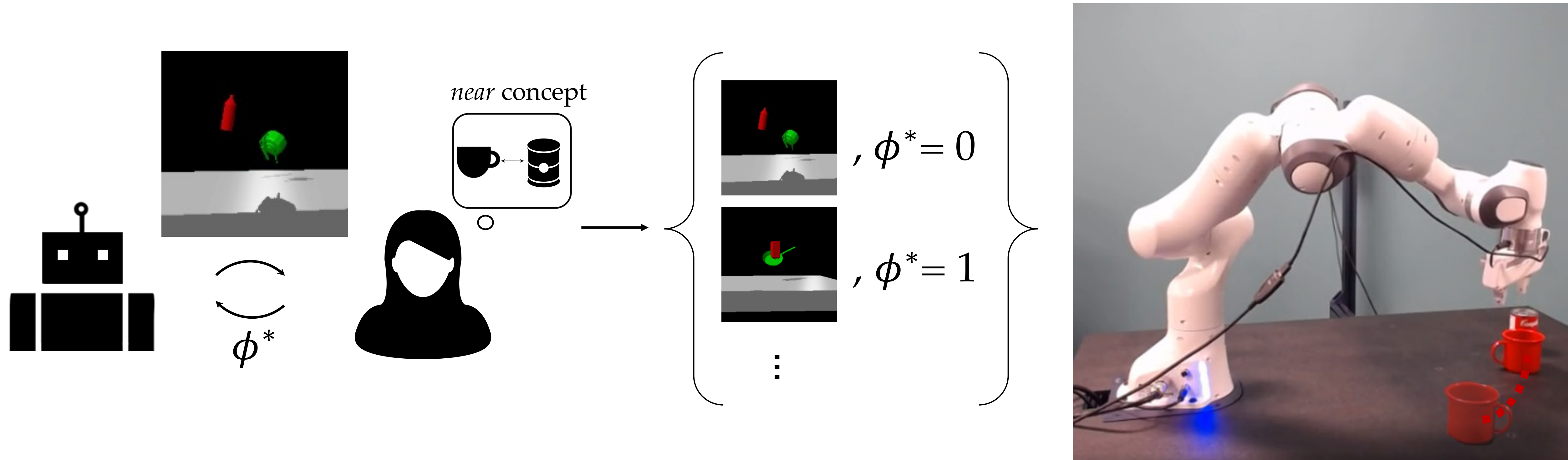


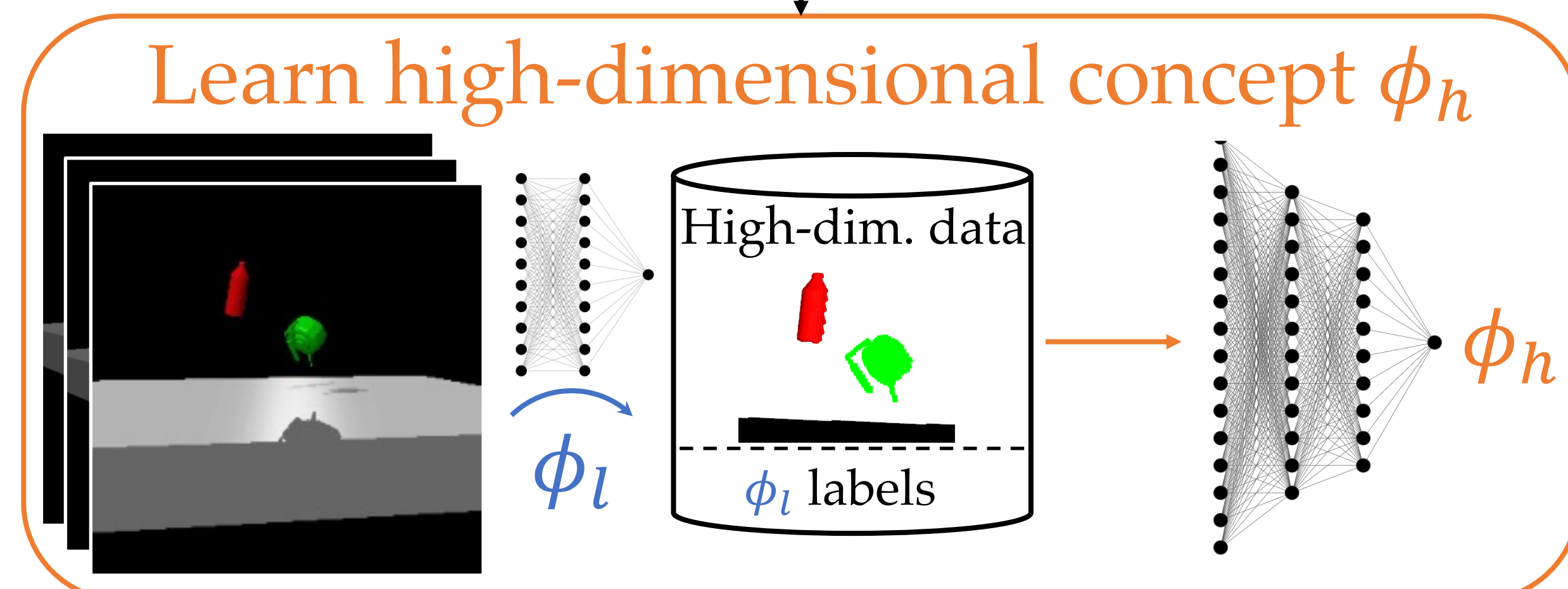
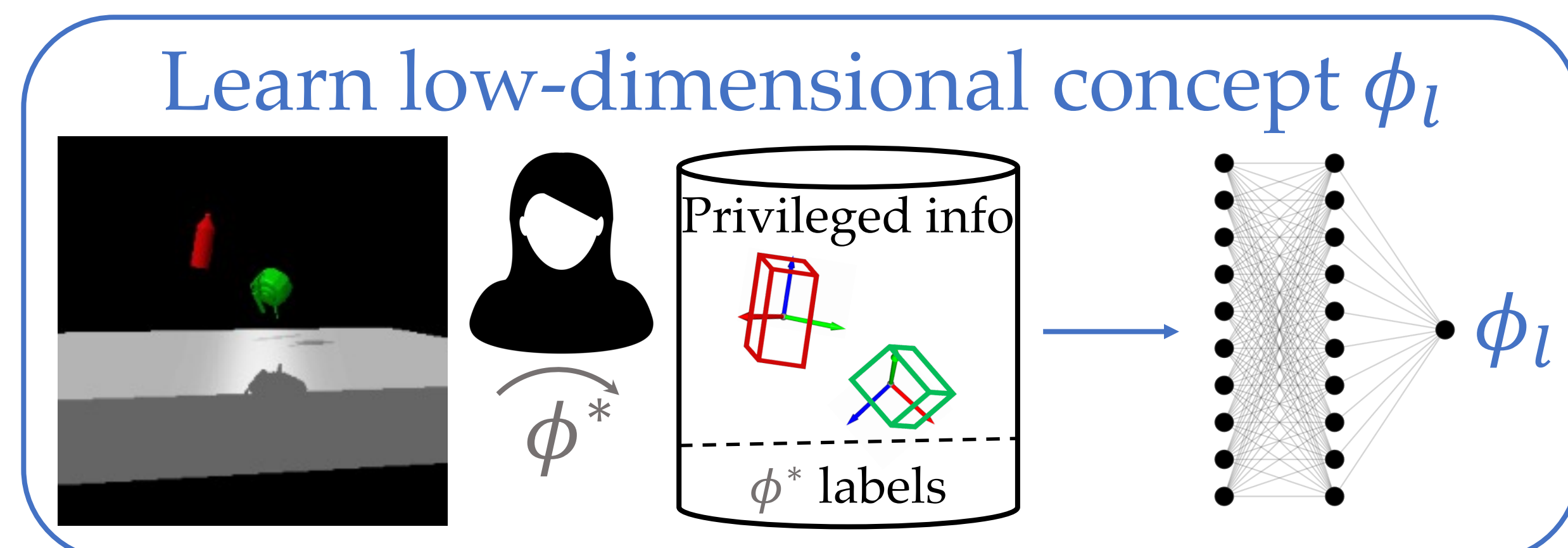
Andreea Bobu, Chris Paxton, Wei Yang, Balakumar Sundaralingam, Yu-Wei Chao, Maya Cakmak, Dieter Fox

**Problem Statement:** How can a user **efficiently** teach the robot a **high-dimensional perceptual concept**  $\phi_h$  (e.g. *near*, *upright*, etc.) useful for motion planning tasks?

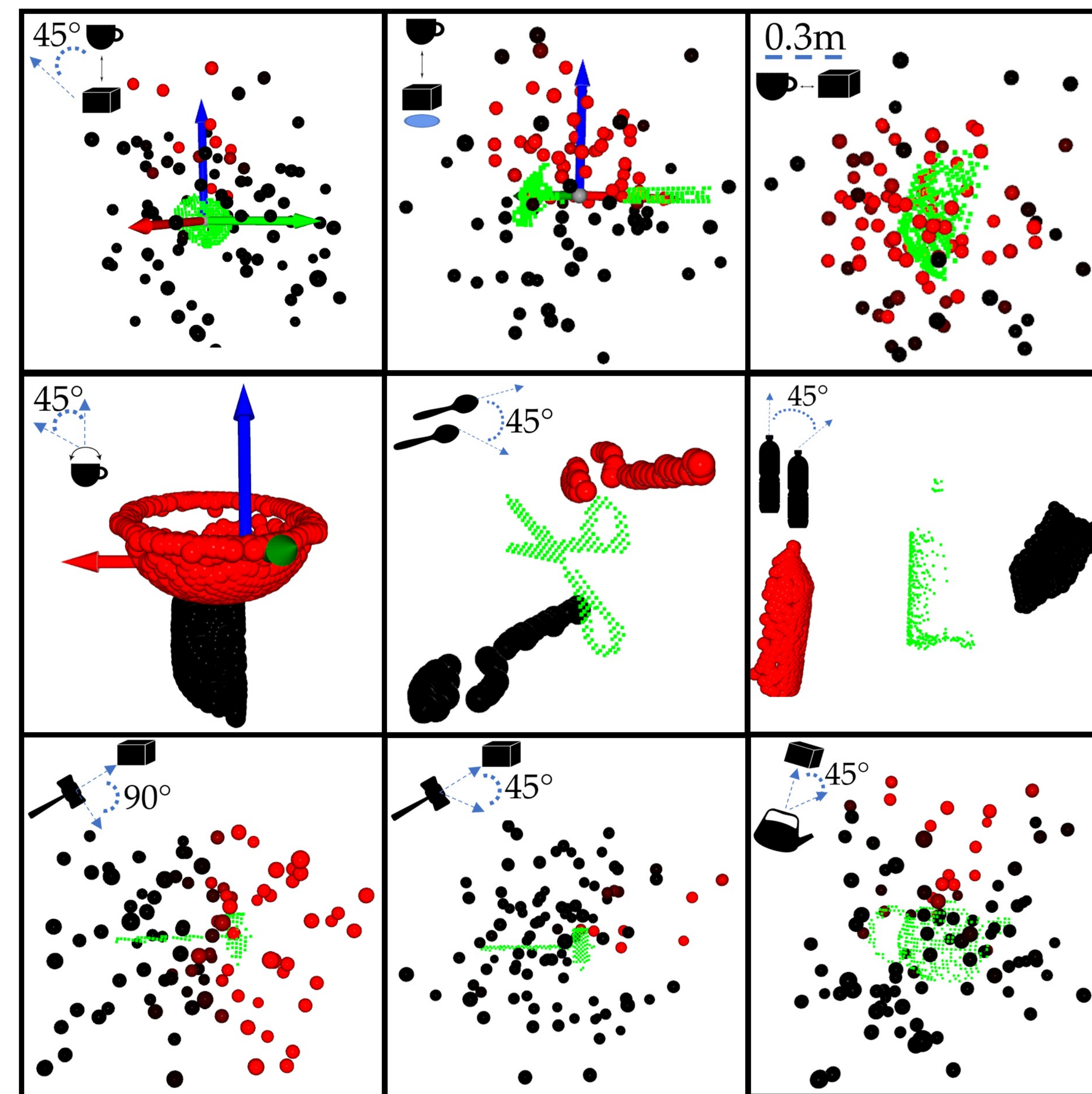
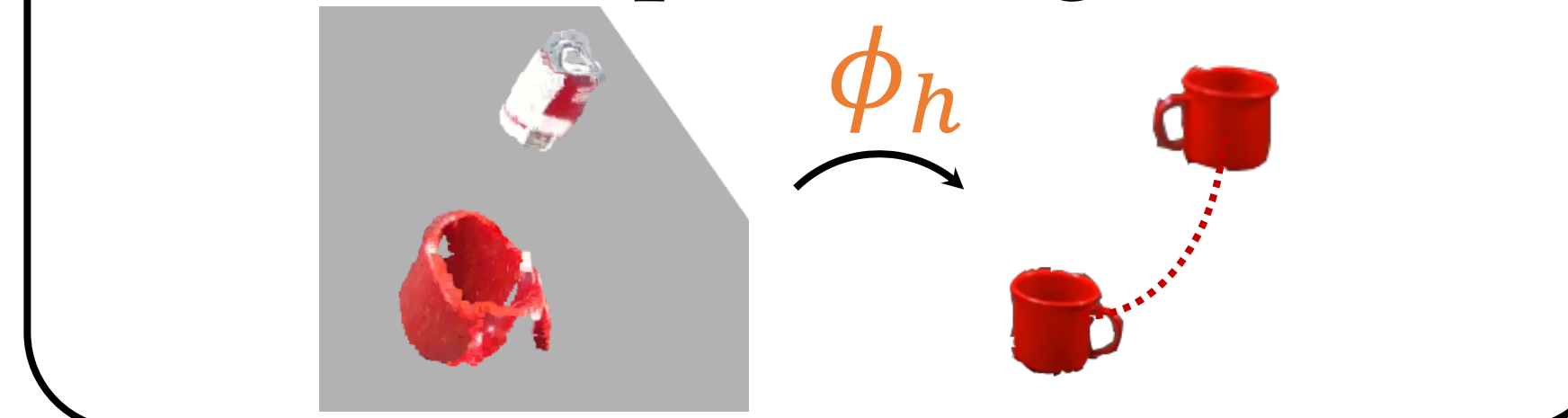


**Key Idea:** To use human input most effectively, the robot should learn the concept on the **low-dimensional privileged space**, then treat that concept as a **labeler**.

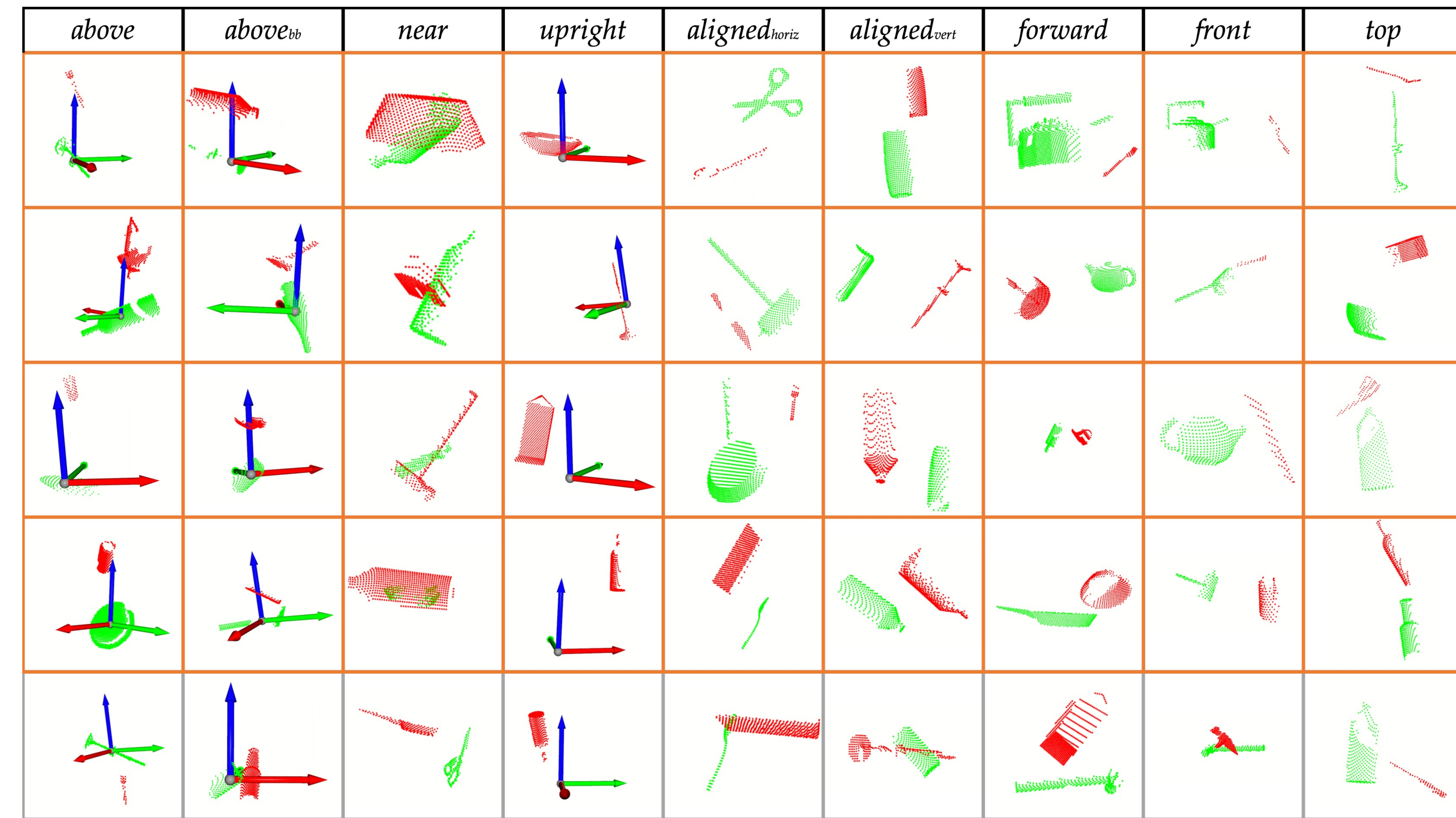
## Perceptual Concept Bootstrapping



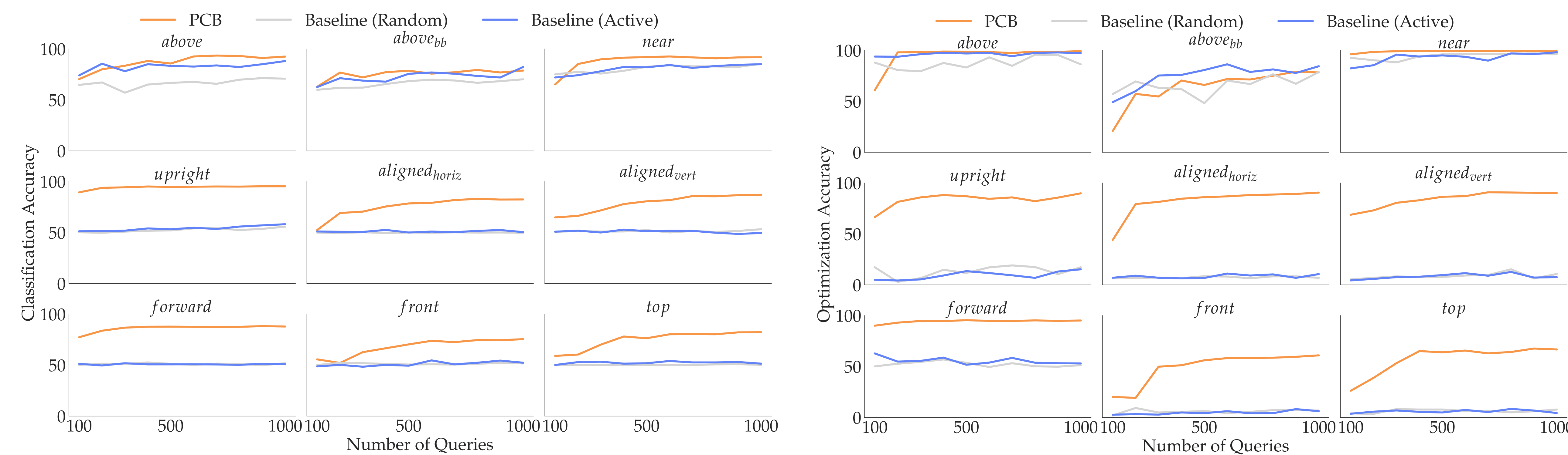
Test-time planning with  $\phi_h$



## Qualitative Examples with $\phi_h$



## Quantitative Results



PCB learns better concepts than a baseline that learns directly from the high-dimensional queries (passive or active), especially when the concepts involve object affordances.