

Motivation

It is intractable for a robot to be pre-programmed to do every task in every setting. One solution is to allow robots to learn new skills in situ, from end user demonstrations.



Demonstrators are capable of teaching a robot skills, when explicitly instructed on how to do so using instructional materials [1]. However, if not prescribed how to teach the robot, end users struggle to provide demonstrations that exhibit abstractions sufficient for a hierarchical task [2].

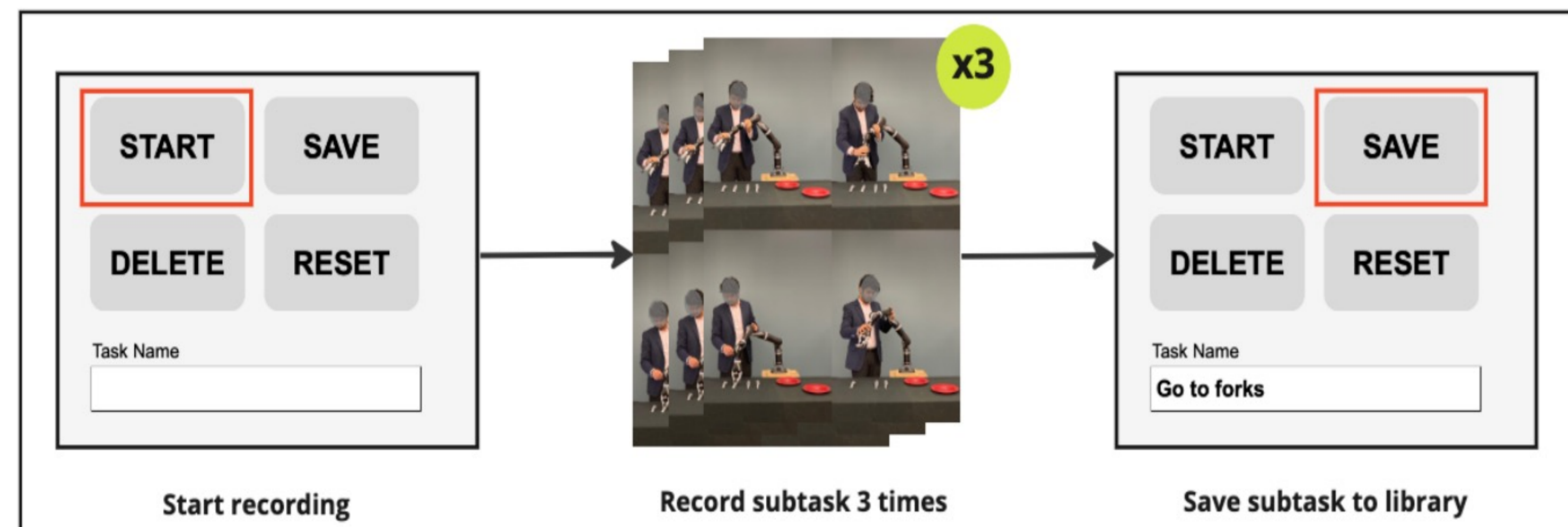


Demonstrators must be trained in order to provide demonstrations that would be usable, and this training is often *domain-specific*.

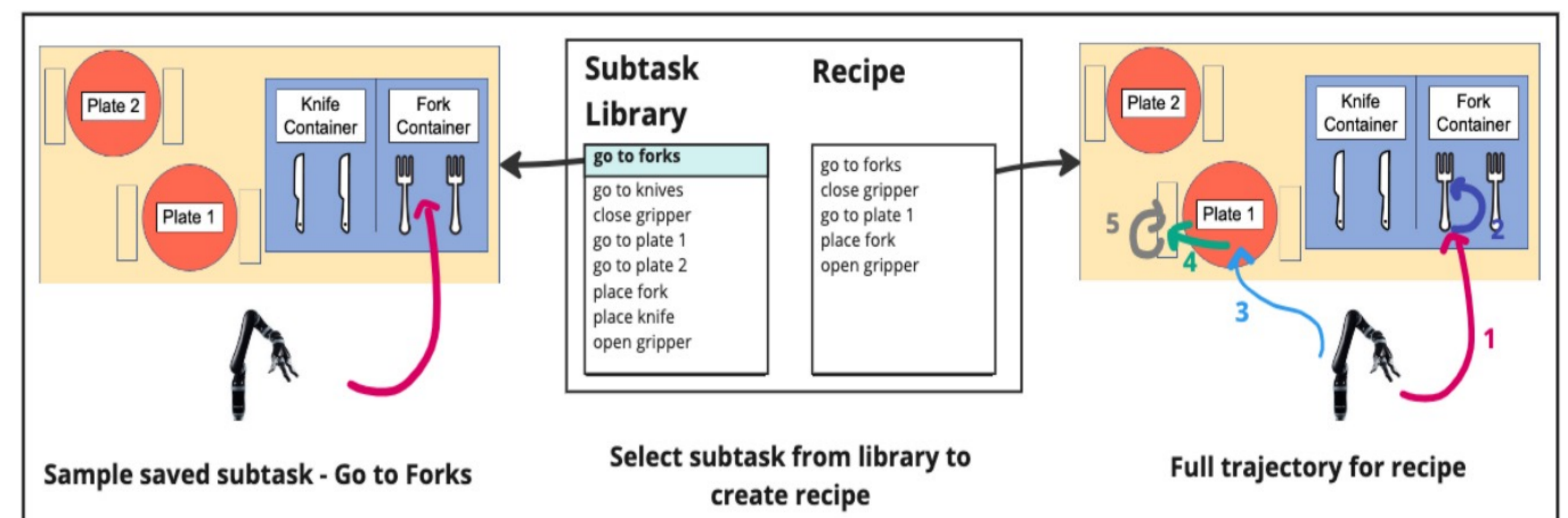
Approach

We investigate whether users improve their ability to teach the robot over time, as they accumulate experience providing kinesthetic demonstrations in various domains.

Record

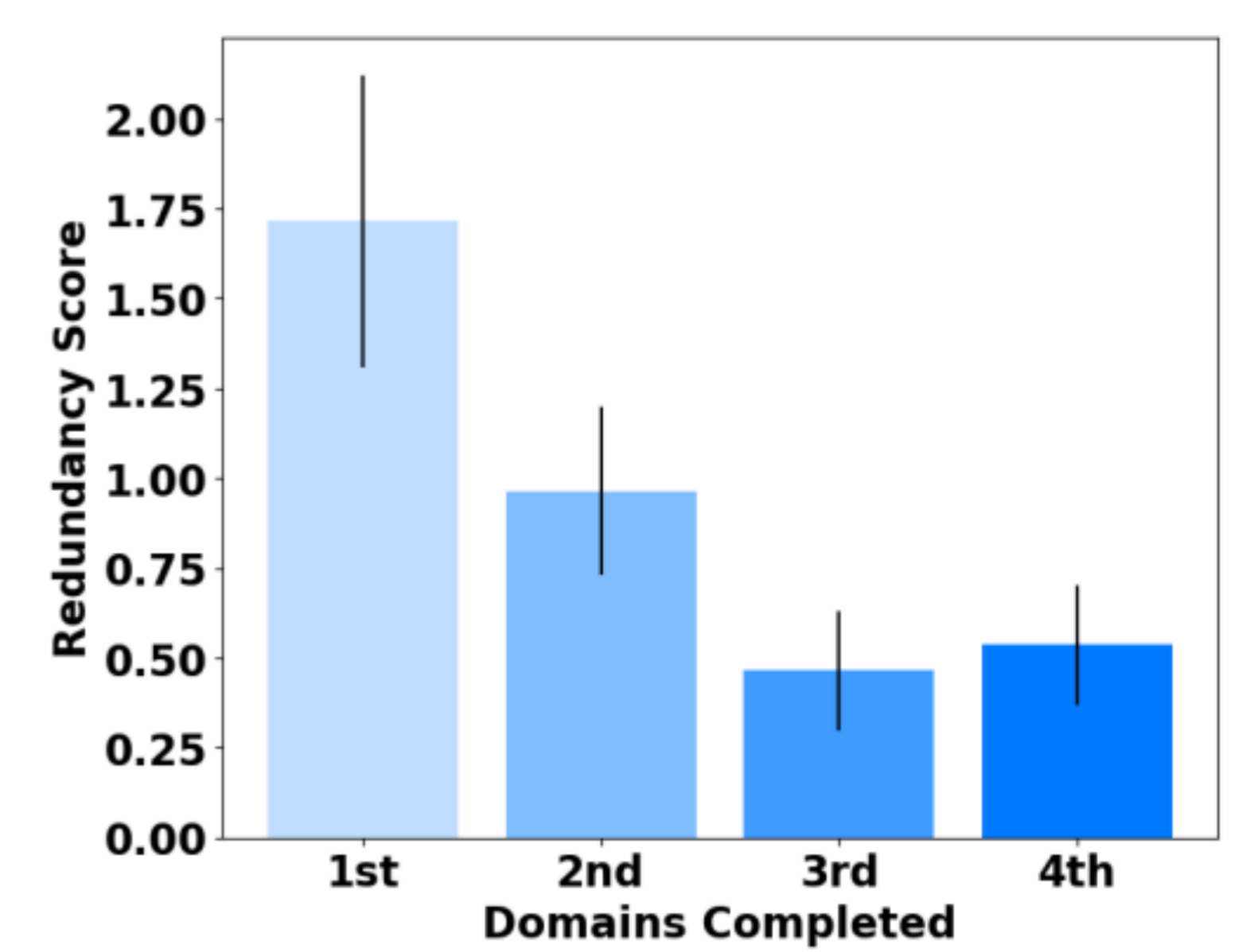
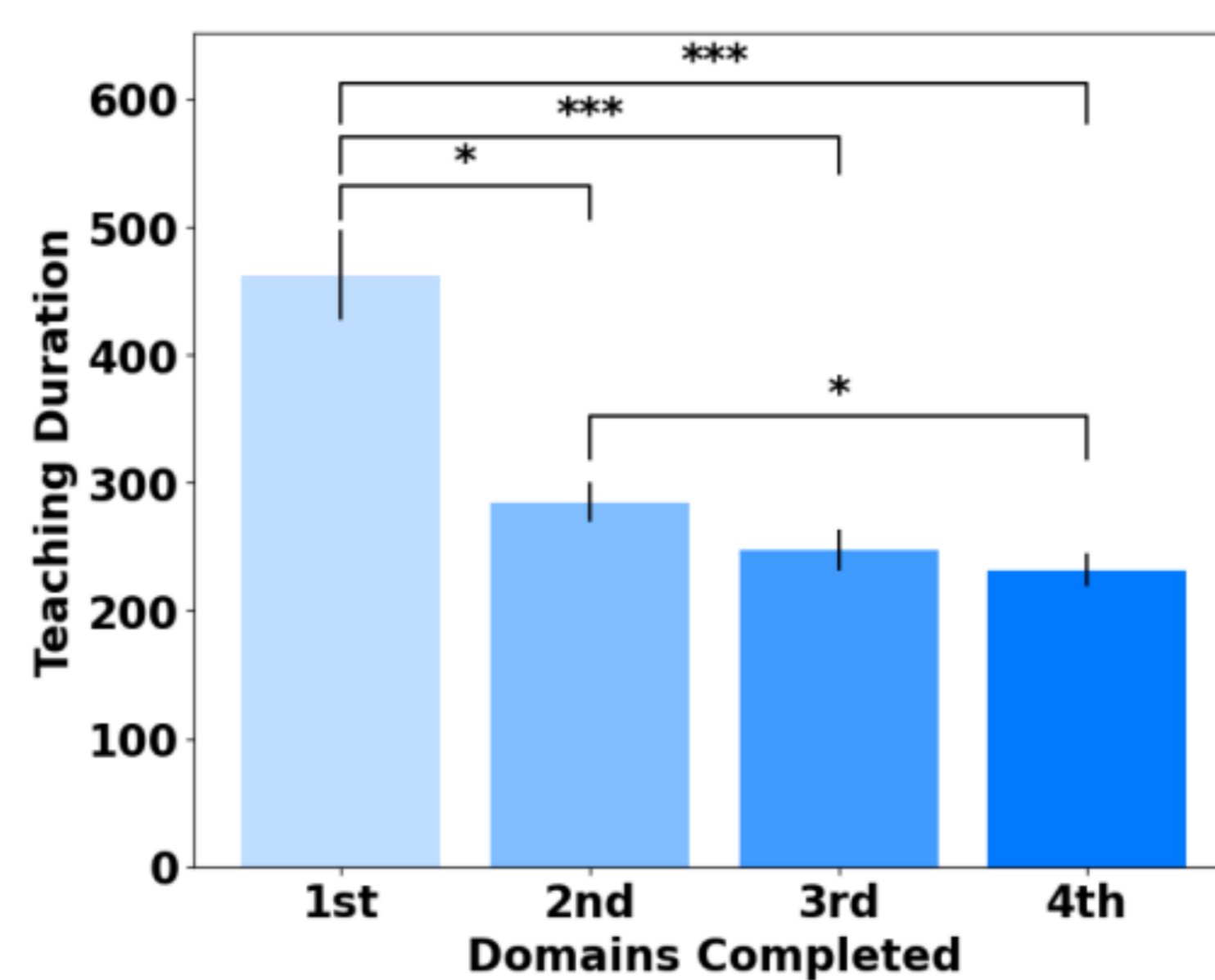
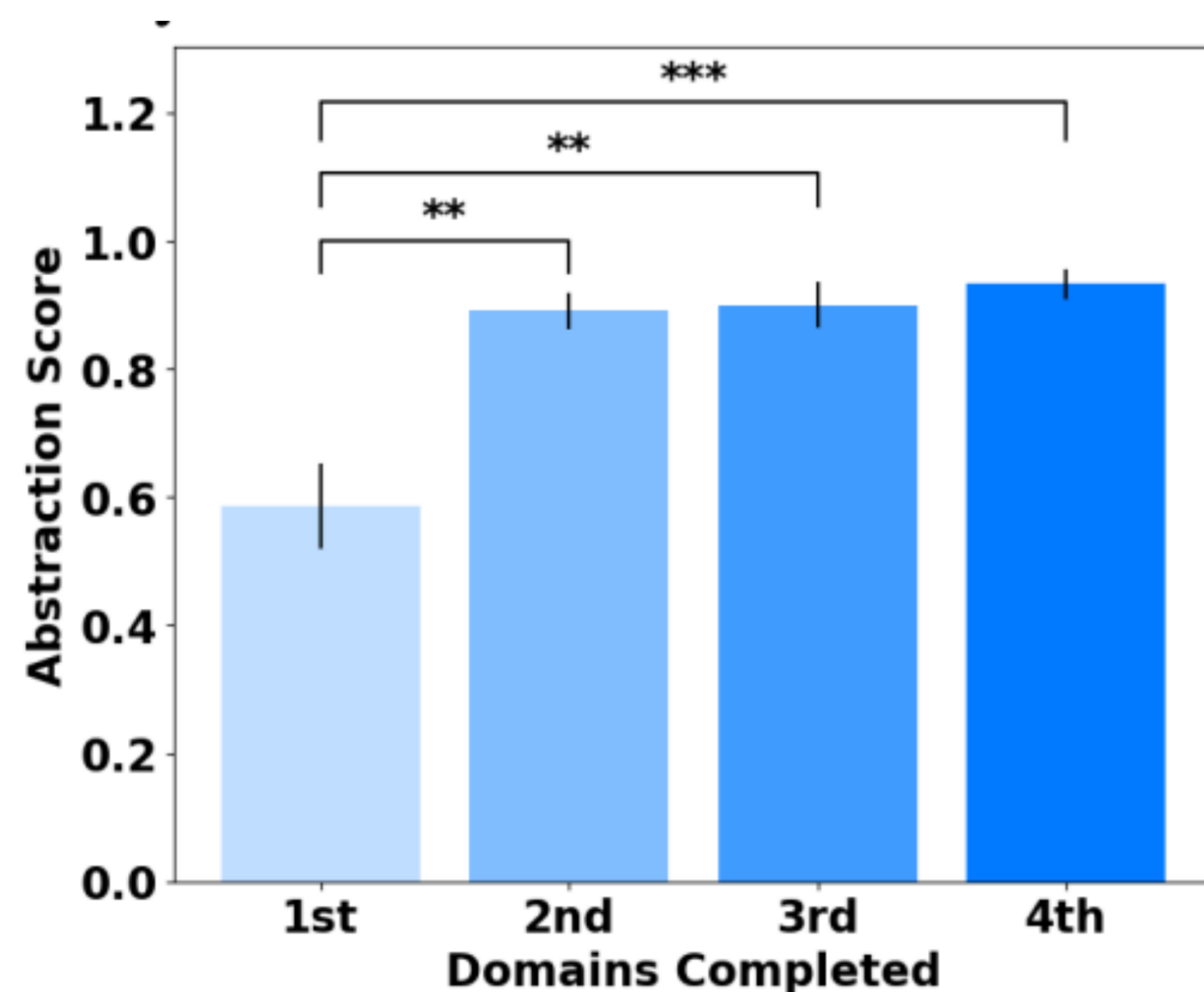


Assemble



Results

We find that as participants gain domain experience they are able to generalize knowledge to novel task domains. We show that with a few hours of training, we can teach human demonstrators to provide sufficient, necessary, and efficient demonstrations in novel domains.



Takeaway 1:

Participants are better able to perform task abstraction with more domain experience.

Takeaway 2:

Participants provide demonstrations more efficiently with more domain experience.

Takeaway 3:

Participants provide fewer redundant demonstrations with domain experience.

References

- [1] M. Cakmak and L. Takayama. Teaching people how to teach robots: The effect of instructional materials and dialog design. 2014 9th ACM/IEEE International Conference on Human-Robot Interaction (HRI), pages 431–438, 2014.
- [2] Nakul Gopalan, Nina Moorman, Manisha Natarajan, and Matthew Gombolay. Negative result for learning from demonstration: Challenges for end-users teaching robots with task and motion planning abstractions