Figure 3: This figure shows a sample training trajectory for the cutting task.

binary interruption metric, along with the duration of time observing the agent prior to interruption, help to support our findings on trust. After each testing trial, participants will fill out the post-trial questionnaire where we will ask them to rate the degree to which they trust the robot to act safely and the degree to which they believe the robot will accomplish the task. The testing iterations will be shown in person for Study 2 and shown as recorded videos for Study 1 and 3. After the testing phase, the participants will complete the post-study questionnaire.

Proposed Analysis

For the data collected in the Post-Study Questionnaire that passes parametric assumptions of normality and homoscedasticity, we will compare each metric across conditions/populations using ANOVAs with Tukey post-hoc corrections. If the data does not pass these assumptions, we will use non-parametric tests such as the Kruskal-Wallis test with Wilcoxon pairwise tests and Bonferonni post-hoc correction. We will additionally analyze each of the metrics in the Post-Trial Questionnaire using a repeated measures analysis to distinguish between user perception of the robot in the knife and medicine sub-tasks. The information collected from the Pre-Study Questionnaire will be used to determine any potential confounds in the analysis. For Study 1, we plan to run 15 participants in each learning condition, 60 total, with a power of $.8$ and $\alpha = .05$; a power analysis on these values yields a large effect size of $.44$. If we run 60 participants for both in person and remote conditions (Study 1 and Study 2), with a power of $.8$ and $\alpha = .05$, the power analysis yields a medium effect size of $.26$. We aim to recruit at least 12 caregiver participants for Study 3. Given the smaller sample size of the target population, we propose to analyze trends between the general population and caregiver population.

Limitations

One limitation of our work is that in Study 1 and 3 the robot is not physically present with the participant. We are thus investigating user perception of the robot based upon the users' experience watching videos and imagining the robot learning in their home. We aim to quantify the impact of this limitation with Study 2.

Another limitation of our work is that we constrain our definition of caregiver to nurses employed in assisted living facilities for ease of recruitment in our first investigation. In future work, we plan to increase the breadth of caregiver recruitment to include caregivers who are not nurses (e.g., adult children of parents receiving care).

Future Work

In future work we will conduct the studies proposed in this paper. Based on these results, we will design a new study (i.e., Study 4) in which we compare various trust repair techniques, applied to a robot that employs the highest effect learning method from Studies 1-3. In Study 4, we propose to evaluate the following three forms of trust repair established in prior work (**????**).

1. An apology provided directly after the trust violation.
2. Transparency of robot learning, provided as a high-level narration of what is learned.
3. An explanation of what caused the error, without acknowledging fault, provided after the trust violation.

Conclusion

We propose a series of human-subject experiments to assess user attitudes towards the concept of embodied care robots that learn in the home, as compared to robots that are delivered fully capable. We investigate the impact of the robot's physical presence on a user's perception of the robot, as well as the differences in robot perception between the general population and caregivers. Based on the findings of our work, we propose to develop guidelines that inform the design of care robots deployed in the home. Finally, we propose to investigate how we can best calibrate trust in embodied learning robots.

Acknowledgments

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