Ex(plainable) Machina: how social-implicit XAI affects complex human-robot teaming tasks

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Introduction

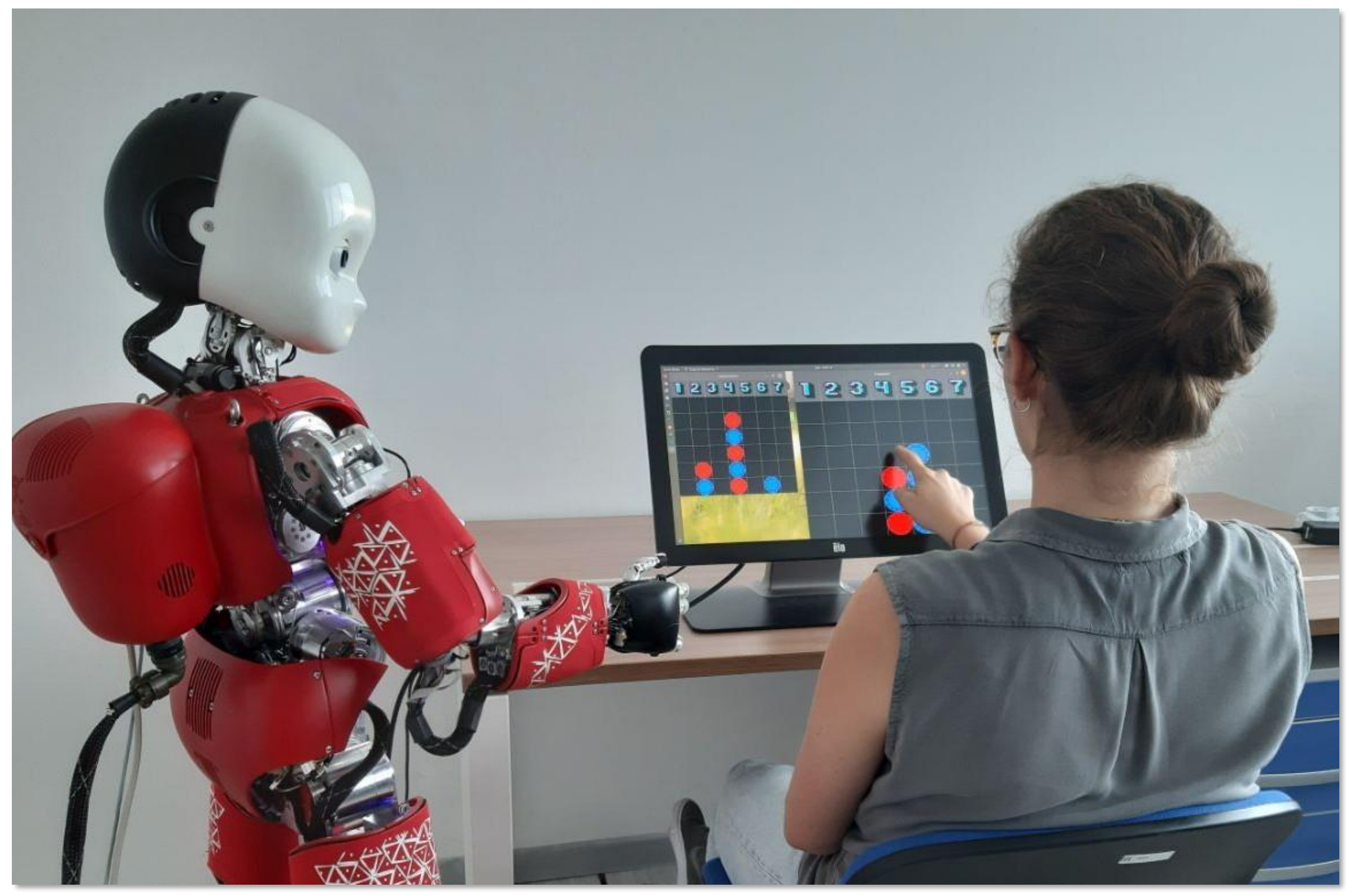
The HRI context is particularly suitable for a social and **user-centered XAI** [1] because people easily adapt their interaction habits to robots [2], and we expect the robots have long-term and personalized interactions with us [3].
However, we know little about the effects of personalized XAI in **social HRI** contexts [4]. In this work, we compare two explanation approaches in a **collaborative HRI decision-making task**: we called them *classical* (CF) and *shared experience*-based (SE).

Research question

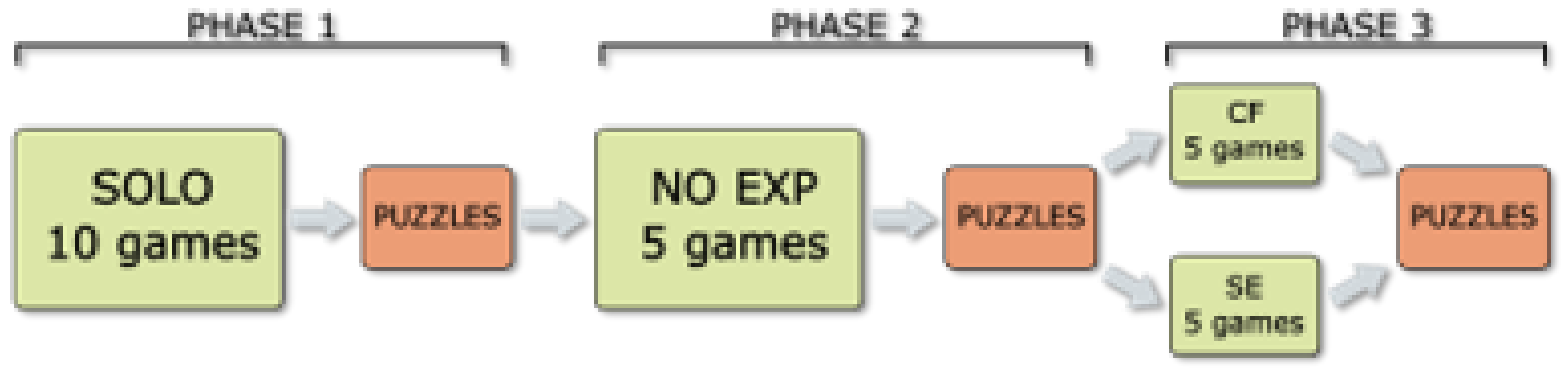
Are explanations based on shared experience more effective than classical ones during human-robot collaborative decision-making tasks?

Methodology

iCub and the participants played the **Connect 4** game against the COM. We had **three phases** which corresponded to the experimental conditions.



1. **SOLO**: participants played alone.
2. **NO EXP**: iCub participated, but it produced only suggestions.
3. **EXP**: iCub participated and it produced also explanations; with half of the participants, it used CF explanations, for the other half the SE ones.

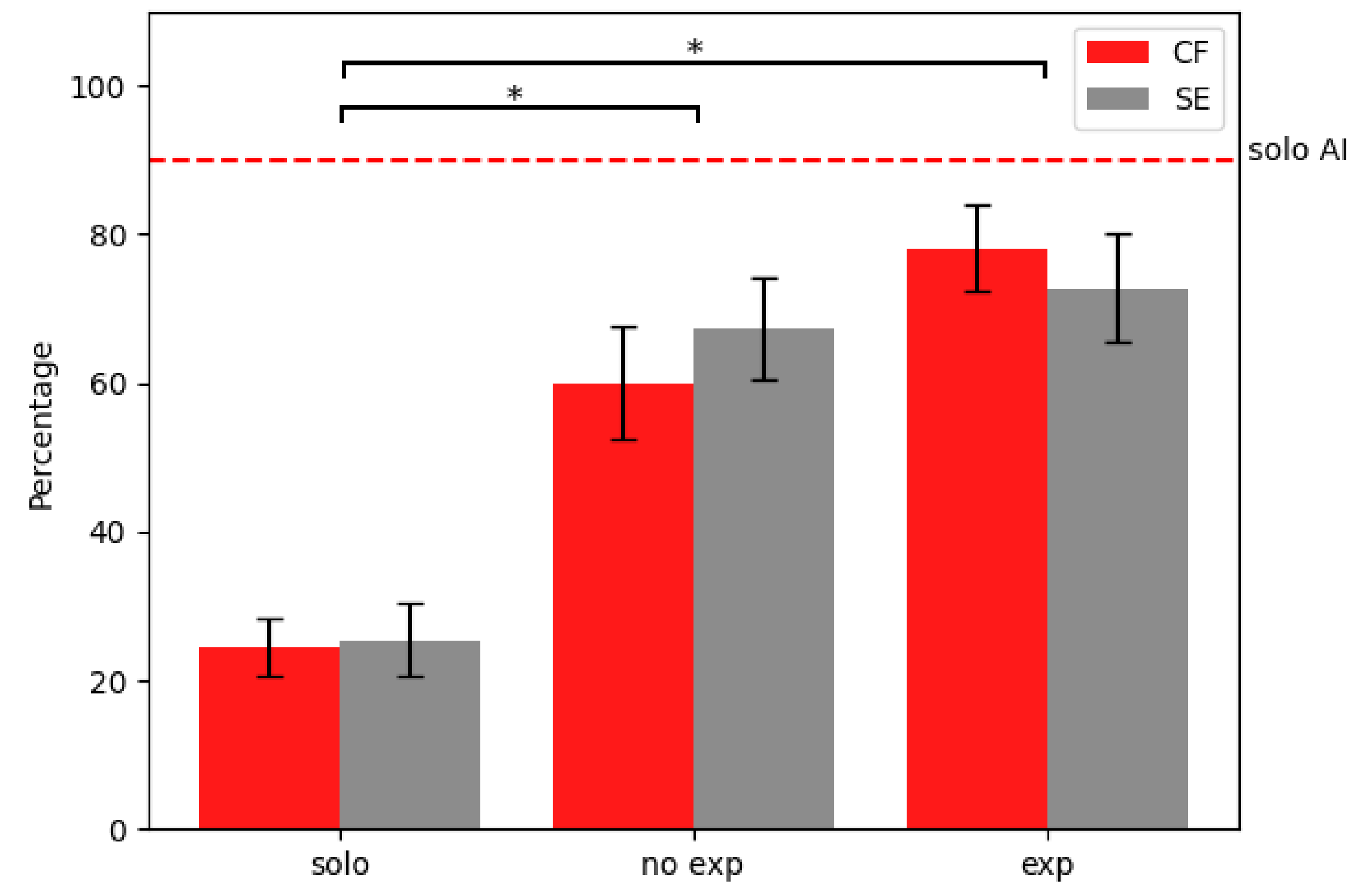


We compared participants' response to types of counterfactual explanations.

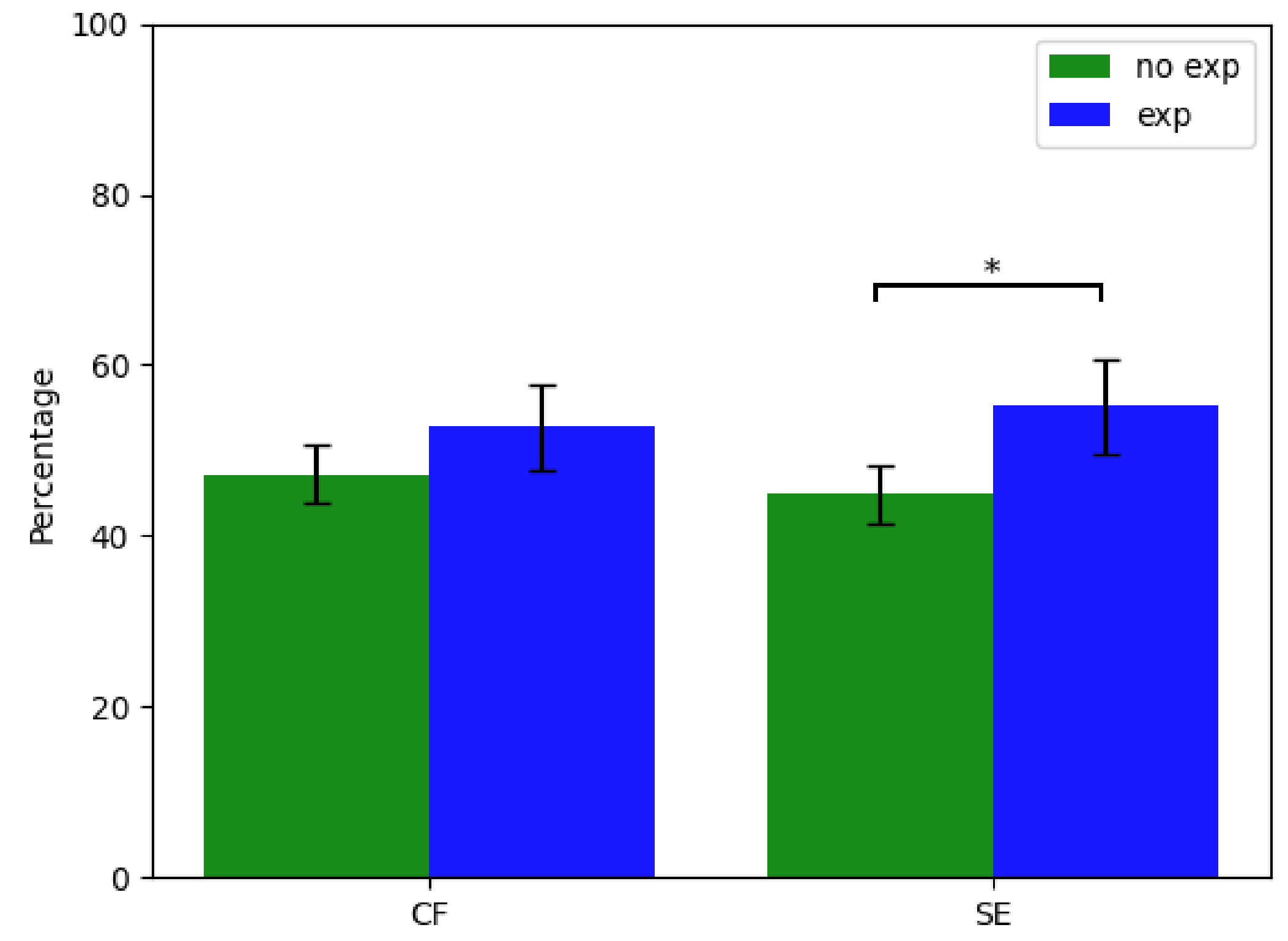
- **CF explanations**: more precise, but hardly previously encountered by participants.
- **SE explanations**: less precise, but taken from the previous games.

Results

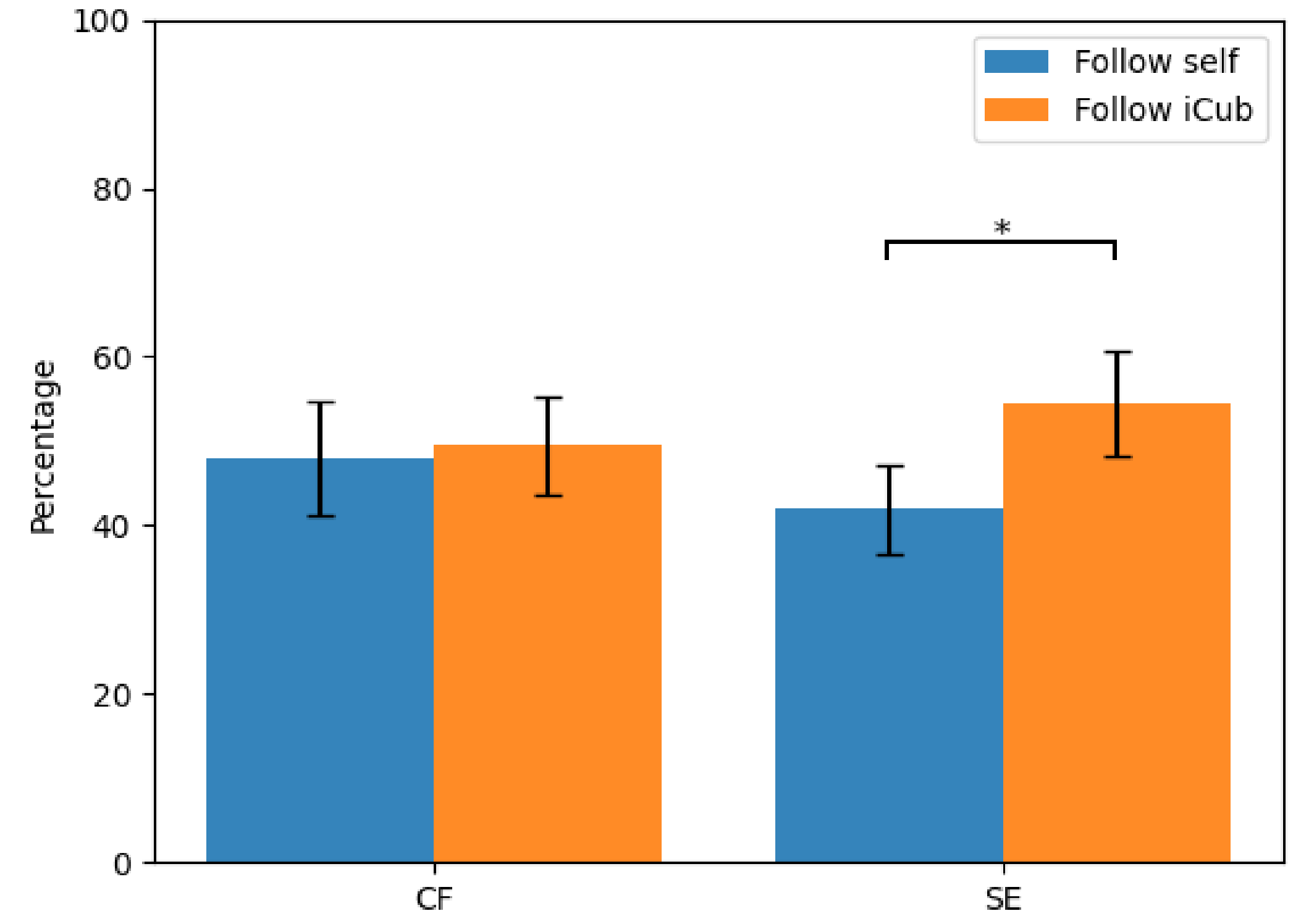
Performance against the COM



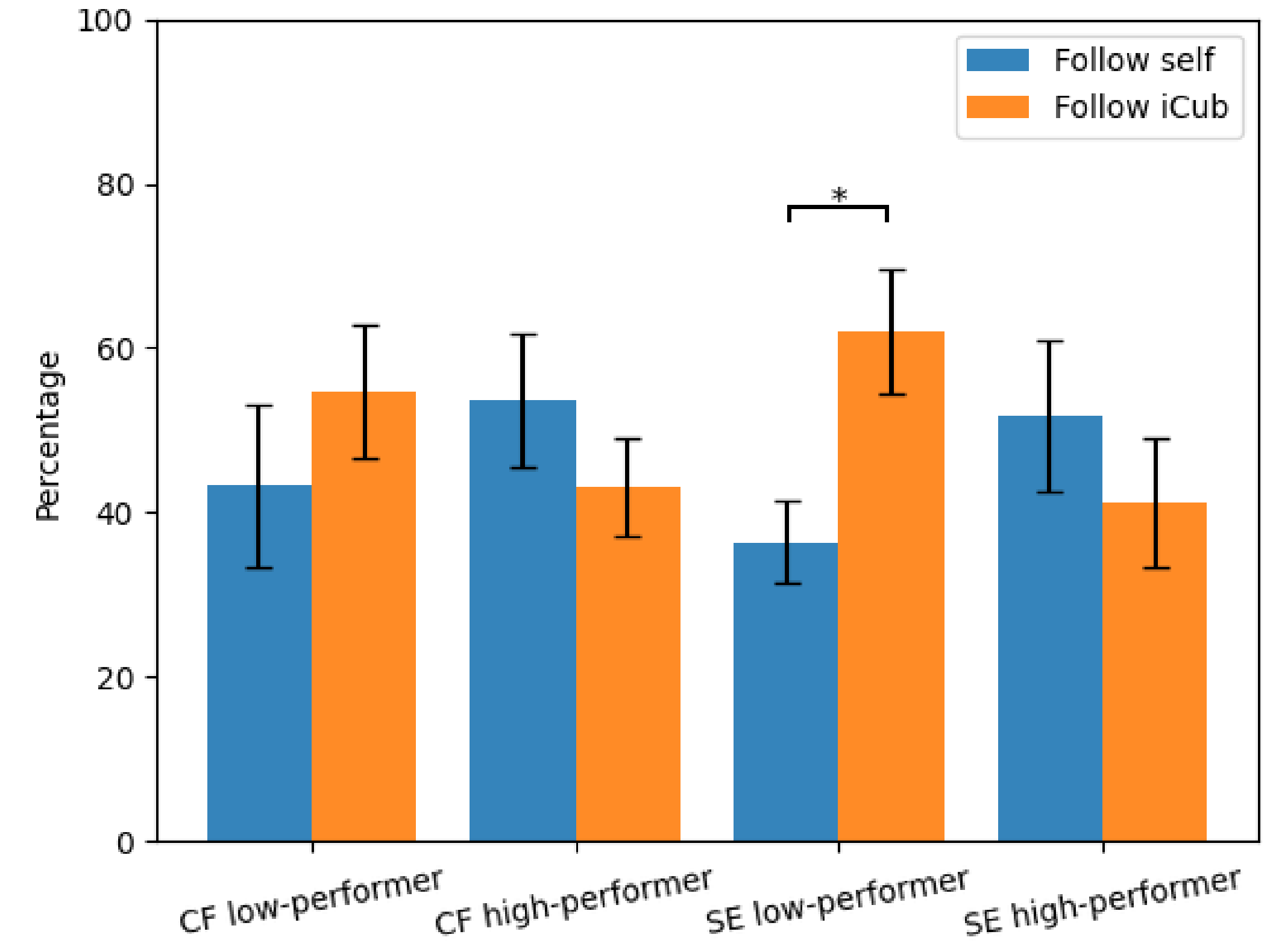
Participants learning



Robot's persuasiveness w.r.t. the explanations type



Robot's persuasiveness w.r.t. participants' performance



Conclusion

- SE explanations led to higher persuasiveness than CF ones.
- The two explanation strategies maintained comparable team performance.
- Low-performer participants followed the robot more than high-performed ones: this highlights the potential issues for letting non-expert users interact with expert robots.

References

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