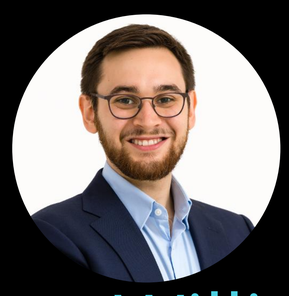
Evaluating **Cognitive Status-Informed Referring Form Selection** *for* **Human-Robot Interactions**

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How does a **cognitive-status informed referring form selection (RFS) model** perform in **live collaborative HRI tasks**?

- Instead of offline, automatic metrics like accuracy, we conducted **a human-subjects study to evaluate the RFS model.**
  - **Random referring forms** vs. **indefinite noun phrases** ({size} {color} {shape}) vs. **model**
- The RFS model **outperformed the random baseline** in task performance, naturalness, understandability, and mental workload.
  - But the model is **not better than the use of indefinite noun phrases**.

What did participants do?

Participants followed the robot's instructions to perform three building construction tasks.

Cognitive status-informed RFS

Givenness Hierarchy theory: Referring forms → hierarchy of cognitive statuses of objects in mind of interlocutors

Level	Cognitive Status	Form
In focus	in focus of attention	*it*
Activated	in working memory	*this,that,this* N
Familiar	in LTM	*that* N
Uniquely id-able	in LTM or new	*the* N
Referential	new	indef. *this* N
Type id-able	new or hypothetical	*a* N

RFS model also uses situated features like **physical/temporal distance.**

Takeaways and Future Work

- Cognitive status-informed RFS models have a long way to go in terms of performance in live human-robot interactions.
- This does not suggest using indefinite noun phrases. Instead, this is evidence for improvement of cognitive status-informed RFS models.
- In the future, one should include multimodal features like gestures.
- This work reminds us of the nuances of language and the fragility of interactions with our new robotic teammates: even a single overly ambiguous pronoun may be enough to derail the overall interaction.