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# Beyond Moral Dilemmas:

Exploring the Ethical Landscape in HRI

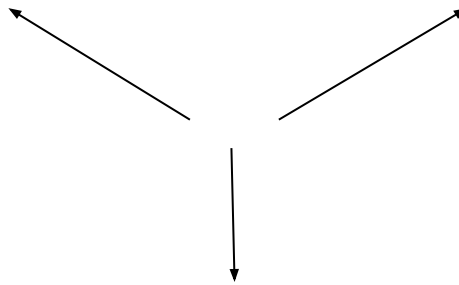


Thomas Arnold and Matthias Scheutz

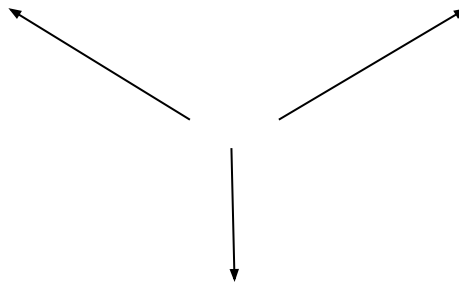
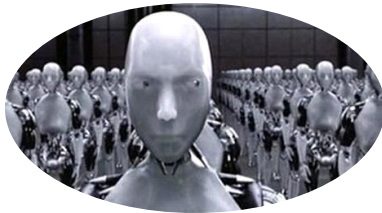
Tufts University Human-Robot Interaction Laboratory

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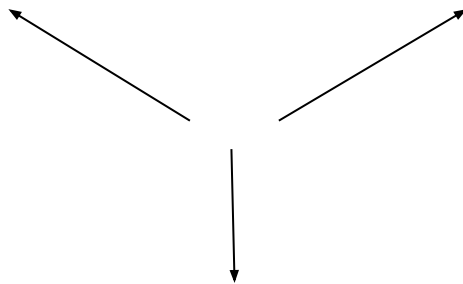
# Extremes and Dilemmas



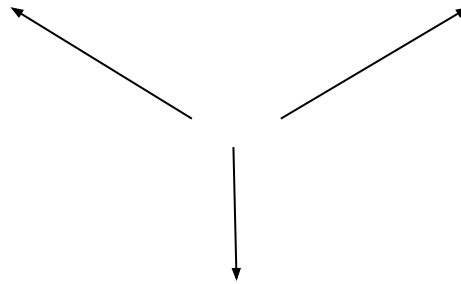
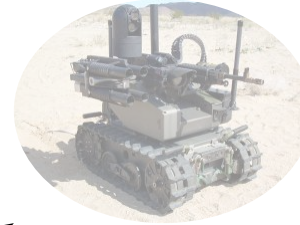
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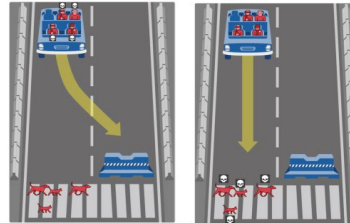
# Extremes and Dilemmas



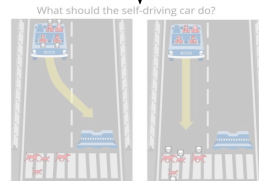
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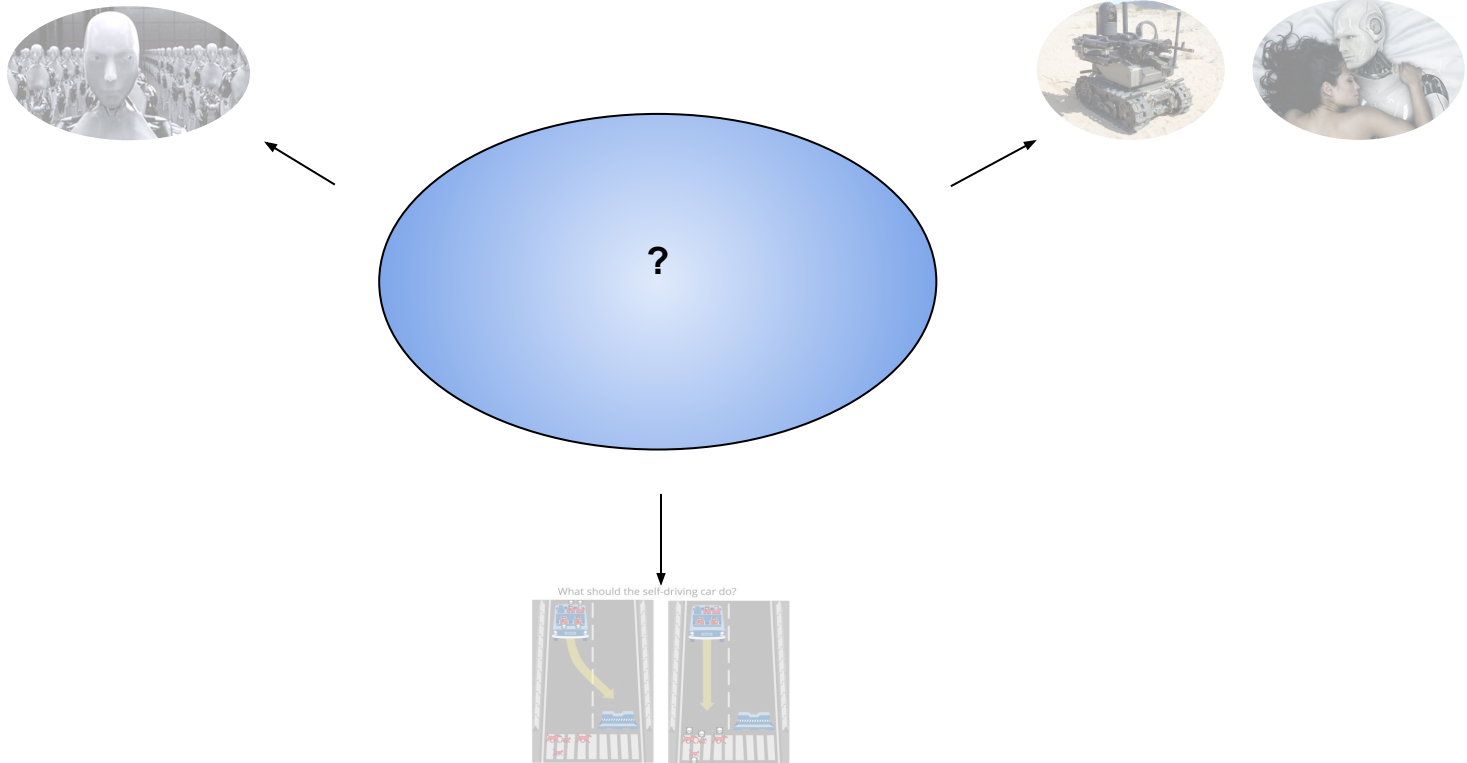
What should the self-driving car do?



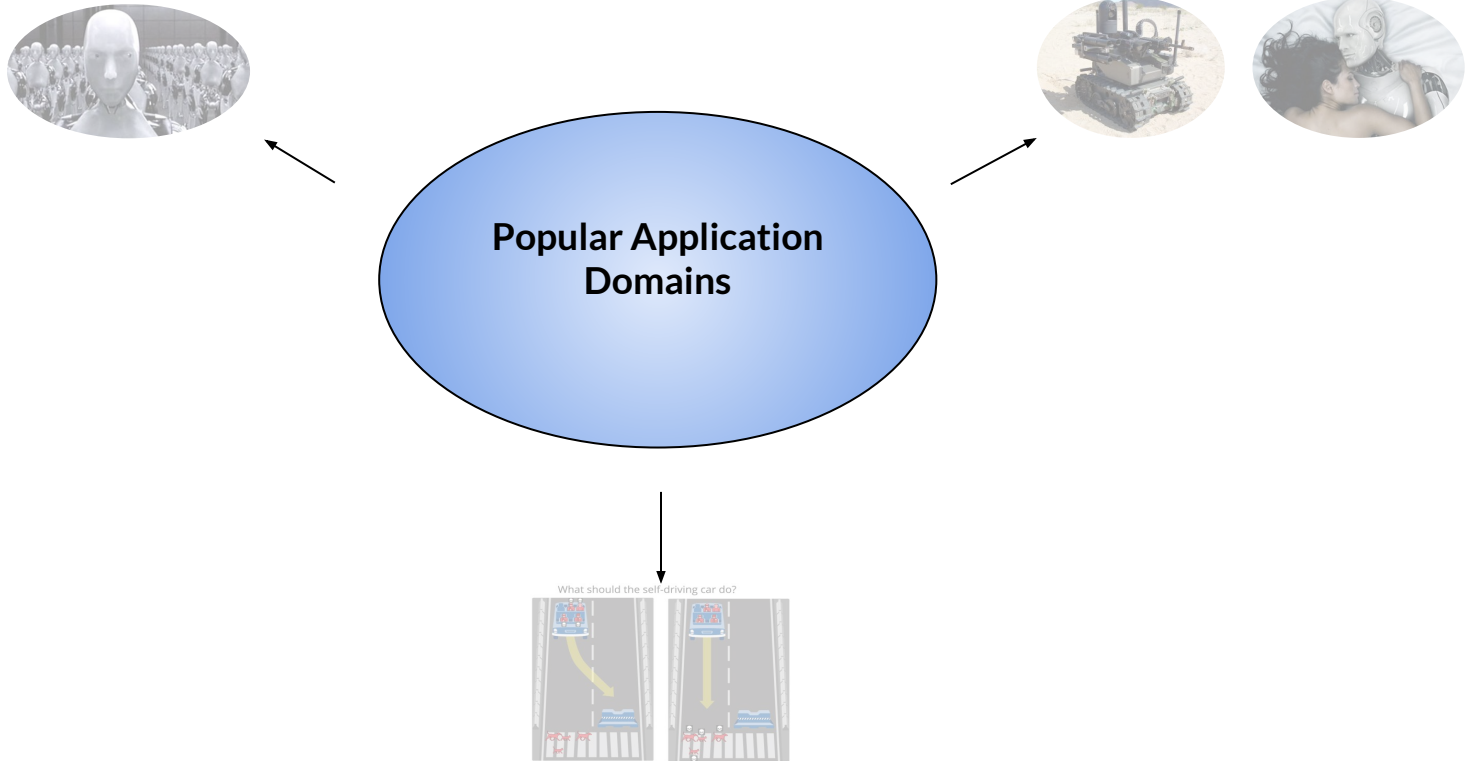
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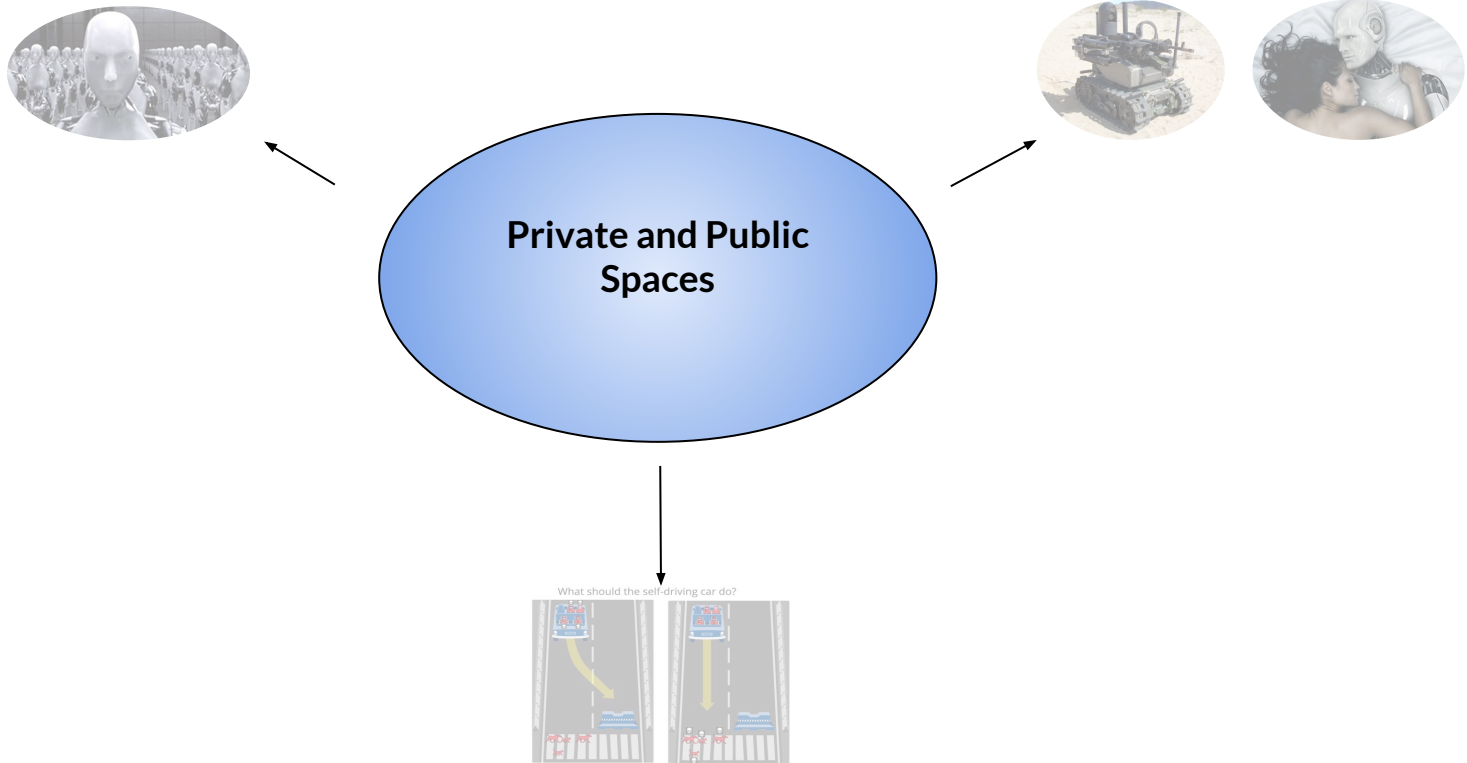


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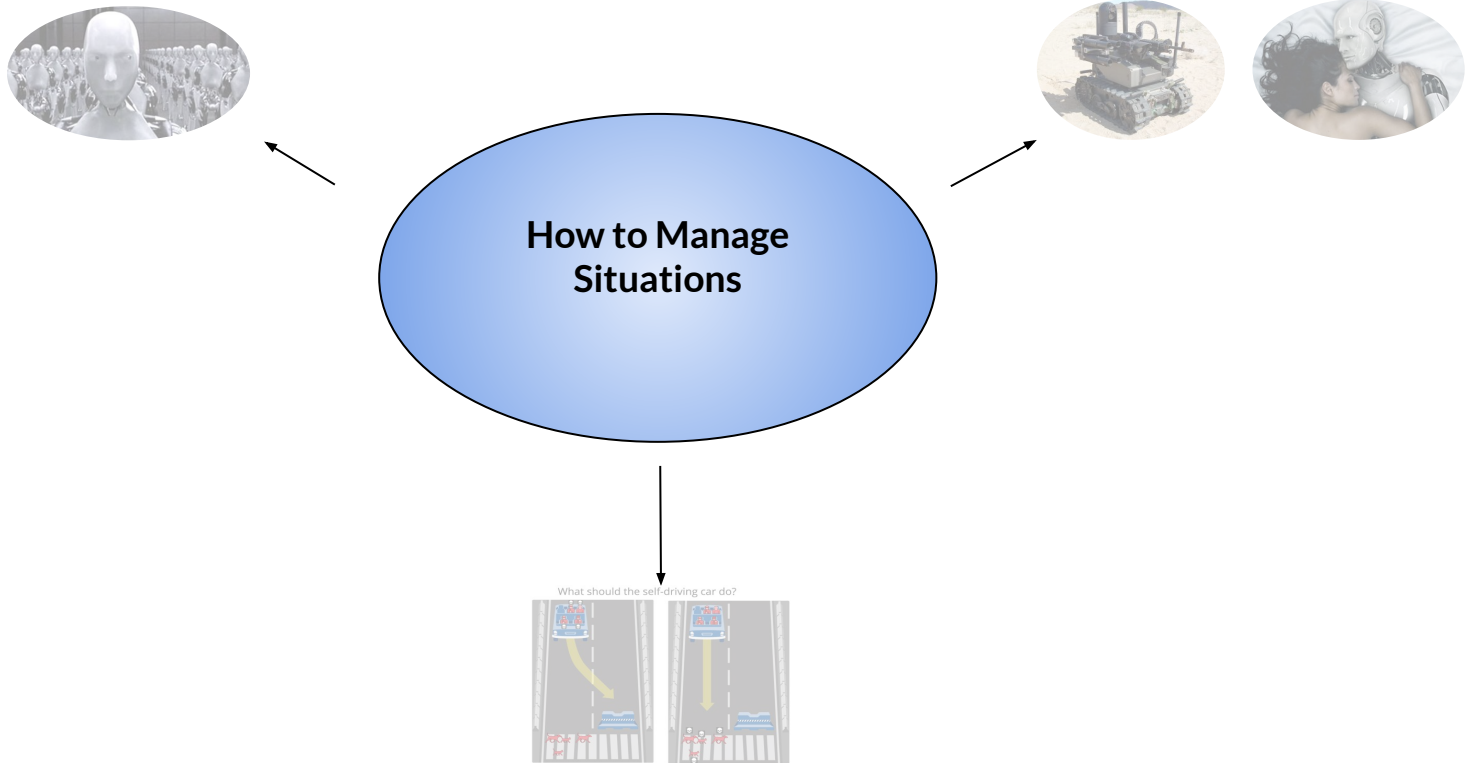




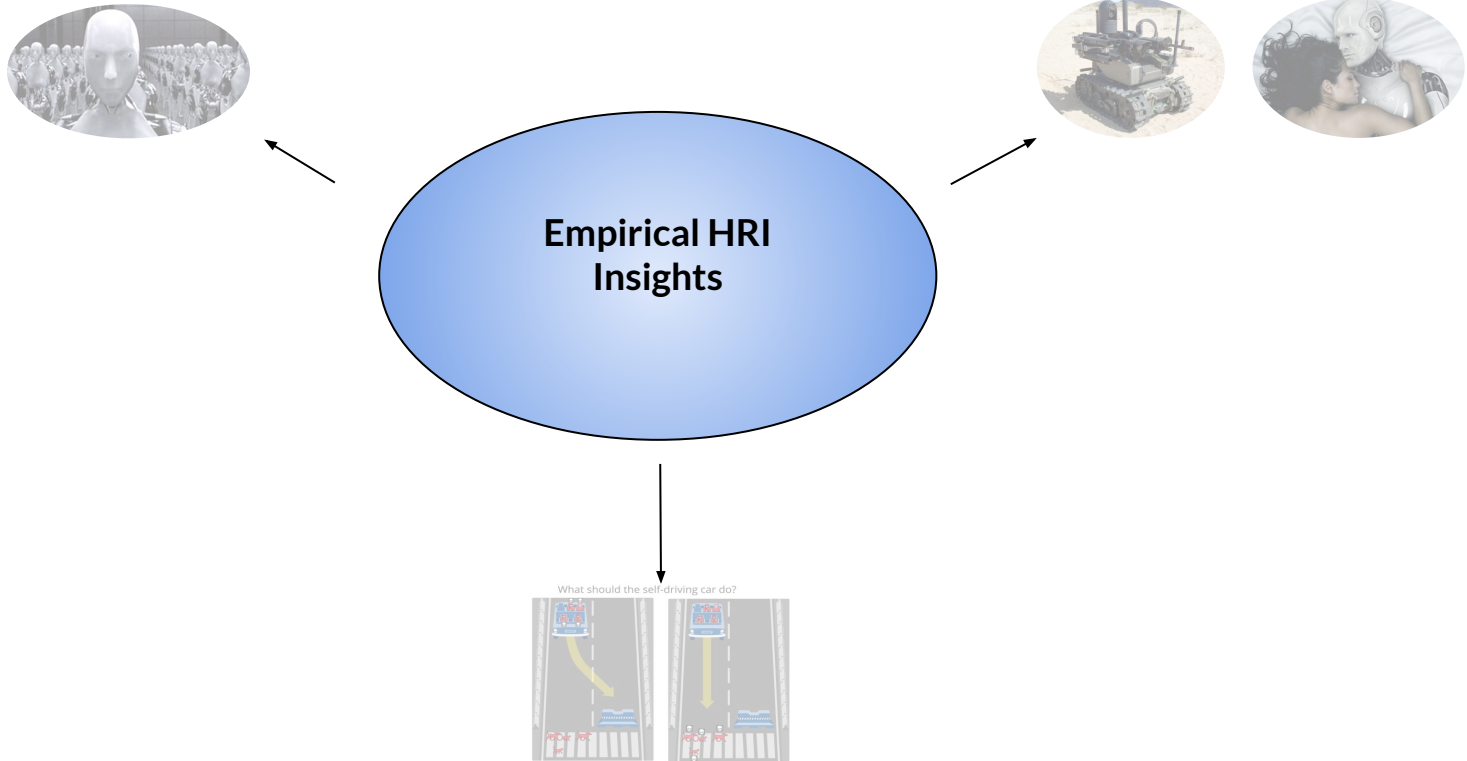
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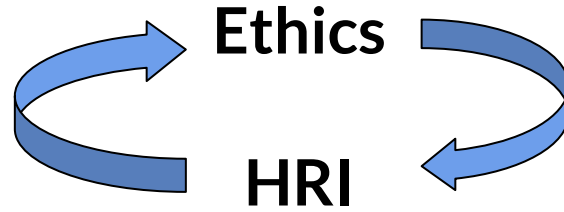


# Extremes and Dilemmas

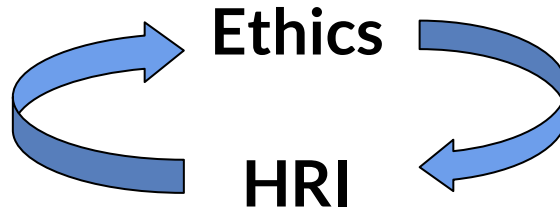


# Inquiry of HRI Ethics

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# Inquiry of HRI Ethics



**3 Scenarios**

**Area of HRI Research (Embodiment, Interests, Group Decisions)**

**Opportunities for Future Research**

# Inquiry of HRI Ethics



→ 3 Scenarios

Area of HRI Research (Embodiment, Interests, Group Decisions)

Opportunities for Future Research

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3 Scenarios

Area of HRI Research (Embodiment, Interests, Group Decisions)



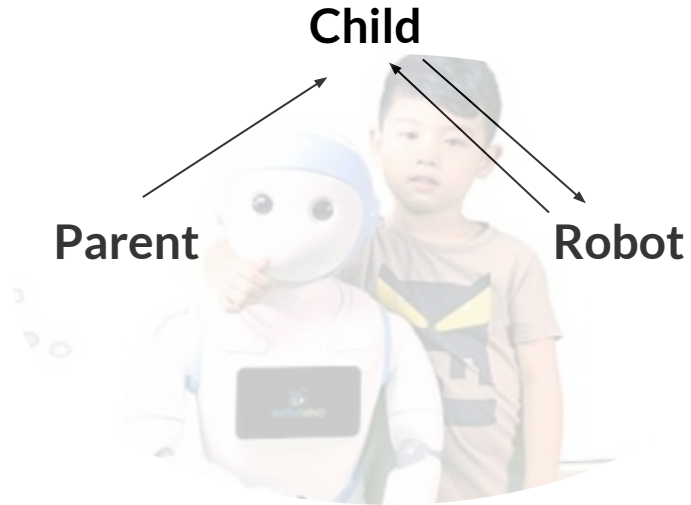
Opportunities for Future Research

## SCENARIO 1: PUSH, PULL, PUNISH, COMFORT, HEAL?

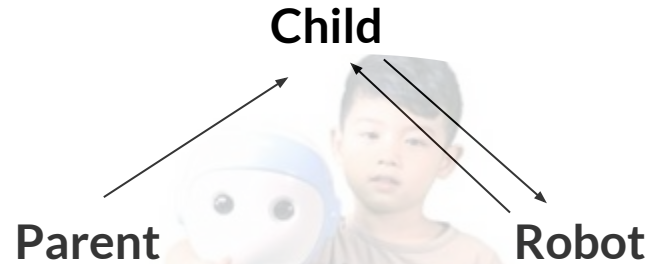


*Image via Avatar Mind <https://news.fastcompany.com/soon-our-kids-will-have-robot-babysitters-4020747>*

# SCENARIO 1: PUSH, PULL, PUNISH, COMFORT, HEAL?



# SCENARIO 1: PUSH, PULL, PUNISH, COMFORT, HEAL?



- Parenting
- Aggression
- Child's relation to robotic comfort/care

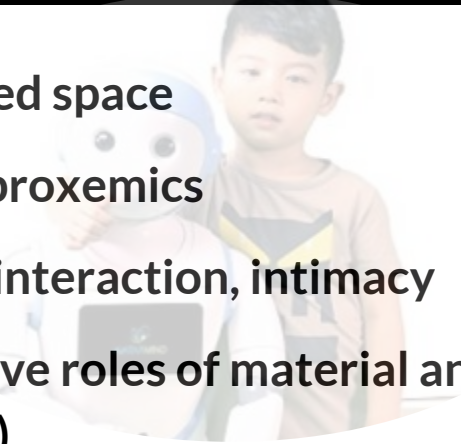
# SCENARIO 1: PUSH, PULL, PUNISH, COMFORT, HEAL?

## Channels of Embodiment



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## Channels of Embodiment

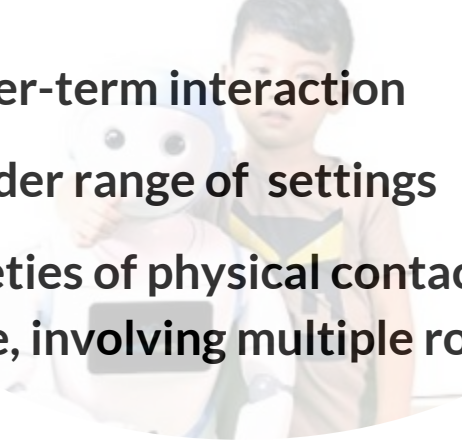
- **Conflicted space**
  - **Touch, proxemics**
  - **Implicit interaction, intimacy**
  - **Suggestive roles of material and form (soft robotics)**
- 
- A young boy with dark hair, wearing a brown t-shirt, is holding a soft, white, robot-like object. The robot has a round head with two small black dots for eyes and a rectangular body with a dark screen. The background is a light, neutral color.

[Dunbar 2010; Ju 2015 ; Li 2015, 2016; Scheutz & Arnold 2017]

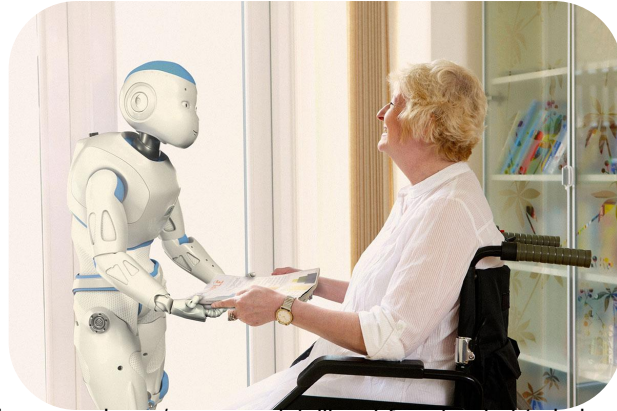
## SCENARIO 1: PUSH, PULL, PUNISH, COMFORT, HEAL?

### Channels of Embodiment: Future Research

- Longer-term interaction
- Broader range of settings
- Varieties of physical contact within shared space, involving multiple roles



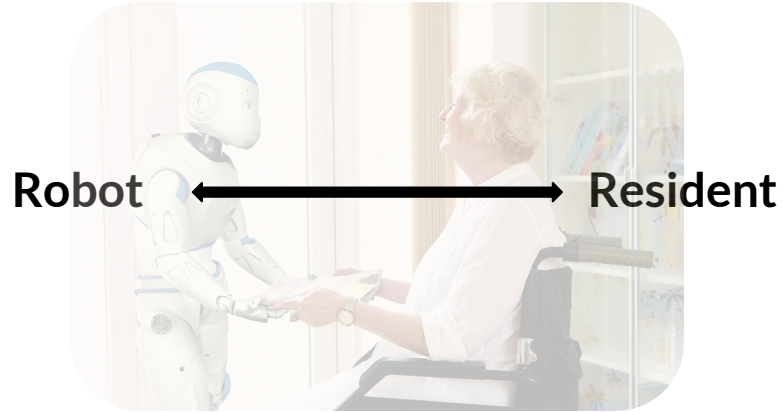
## SCENARIO 2: TALK TO ME



<http://www.technocrazed.com/romeo-an-intelligent-french-robot-to-help-elderly-with-daily-tasks>



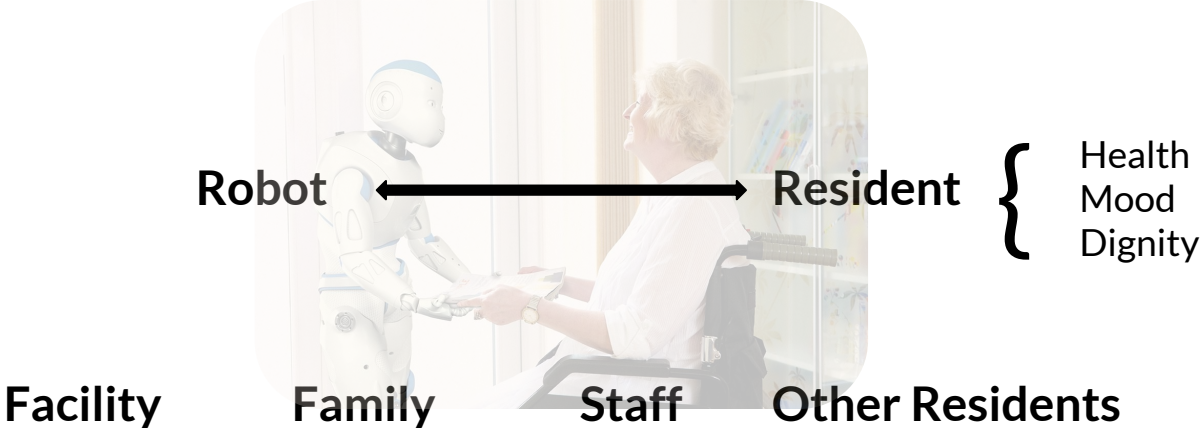
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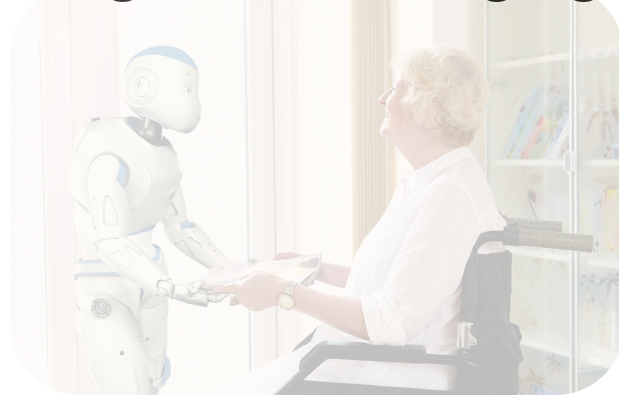


# SCENARIO 2: TALK TO ME



## SCENARIO 2: TALK TO ME

# Competing and Converging Interests



## SCENARIO 2: TALK TO ME

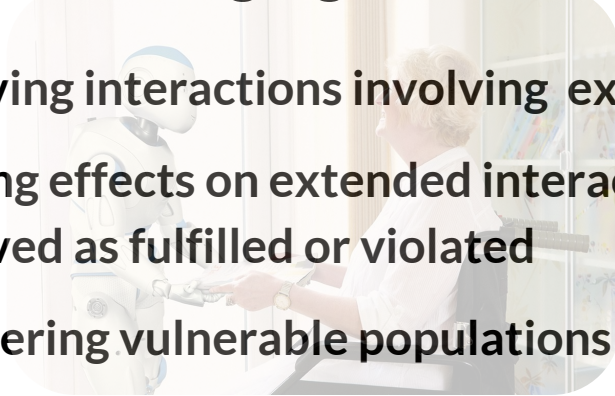
### Competing and Converging Interests

- Interests can differ from tasks and social roles
- Personal growth, dignity, privacy, equal treatment, safety
- One-on-one interaction: intra-personal and interpersonal
- Whose interests do robots represent, and which ones take precedence?

## SCENARIO 2: TALK TO ME

### Competing and Converging Interests: Future Research

- Observing interactions involving explicit and implicit interests
- Tracking effects on extended interactions when interests perceived as fulfilled or violated
- Considering vulnerable populations



## SCENARIO 3: RESCUE TEAM



<http://www.fdma.go.jp/en/pam13.html>

## SCENARIO 3: RESCUE TEAM





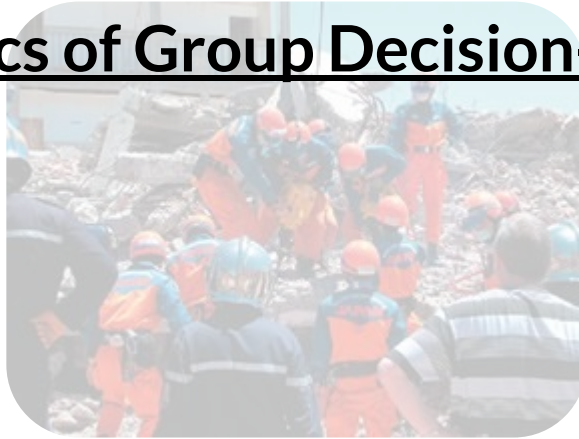
## SCENARIO 3: RESCUE TEAM



- **Task efficiency**
- **Problem-solving**
- **Urgent demands on communication/action**

## SCENARIO 3: RESCUE TEAM

# Dynamics of Group Decision-Making



## SCENARIO 3: RESCUE TEAM

### Dynamics of Group Decision-Making

- Ongoing Relationships
- Authority and Collaboration
- Teams Managing Distinct Robotic Abilities

[Arkin et al. 2012; St. Clair & Mataric 2015; Gombolay 2016; Williams, et al. 2015]

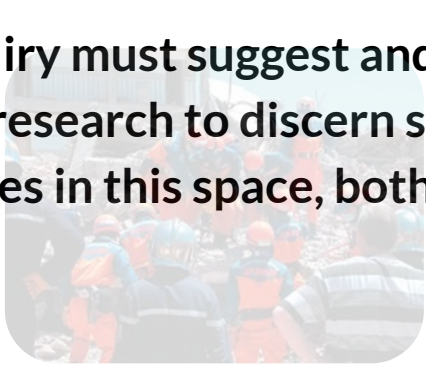
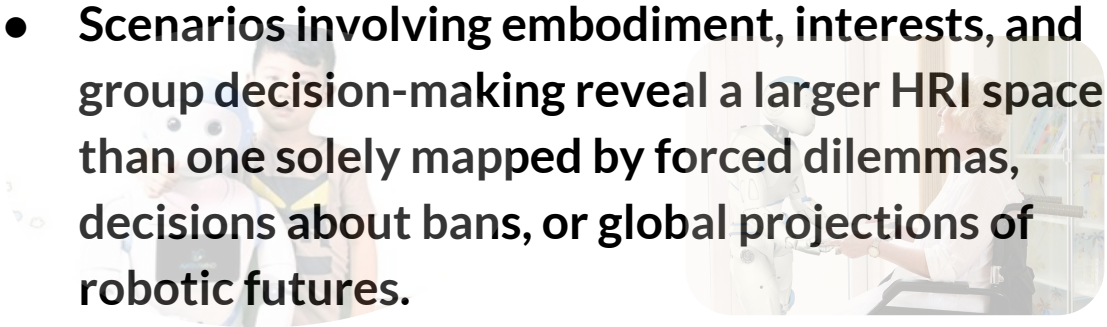
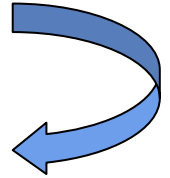
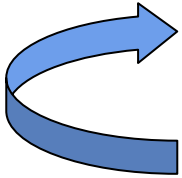
## SCENARIO 3: RESCUE TEAM

### Dynamics of Group Decision-Making: Future Research

- Team attributions (vs. in-group, likeability, trust)
- Pragmatics of opposing requests and statements
- Outward presentation to non-team actors
- Finding appropriate projects (e.g. Escape the Room)

# Summary

- Scenarios involving embodiment, interests, and group decision-making reveal a larger HRI space than one solely mapped by forced dilemmas, decisions about bans, or global projections of robotic futures.
- Ethical inquiry must suggest and draw upon future HRI research to discern stakes and opportunities in this space, both for policy and design.



# Moving Forward

- More systematic frameworks are needed to identify areas left out by extreme choices and dilemmas, to insure interactions and those they affect are not ignored for lack of an obvious crisis or controversy.
- Ethics-based HRI research can provide empirical and contextual substance missing in broader AI and tech ethics discussions, including treatments of new technologies (e.g. shared space and augmented reality).

# Beyond Moral Dilemmas

Exploring the Landscape of HRI Ethics

**Tufts**  
UNIVERSITY

hrrf  
lab

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**THANK YOU!**





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