Agency

Week 8 of 16-867 Human-Robot Interaction
Laura Herlant
Announcements

• Wed March 8 – A Day Without Women
• Next reading assignment somewhat heavy, but already read one of the papers
Cliff Nass – Requirements for Teams

Teammate vs. Partnership
• Common goal
• Mental models
• Subjugate Individual needs (self)
• Interdependence as positive
• Trust
• Self-awareness
Cliff Nass – Ants as team members?

**Agree**
- Don’t have individual desires beyond survival
- Ants do not have a common mental model
- Helps other ants find food by use of pheromone scent trails
- No conscious subsuming of individuality because no awareness of “self”

**Disagree**
- Team definition too narrow
- Exhibit attributes of teamwork: communication, collaboration, common goal
- Perform a collective effort
Our class’s requirements for Teams

Teammate vs. Partnership

- Common goal
- Mental models
- Subjugate Individual needs (self)
- Interdependence as positive
- Trust
- Self-awareness
Cliff Nass - Trust

• Cannot trust machines:
  • Machines cannot trust, feel guilt, or betrayal
  • Lack of commitment to team goals
  • Cannot develop mental models of humans

• How can we feel trust towards our cars?
  • No autonomy to act on its own, so predictable
  • Cars are “tools” not “teammates”
  • Confounding trust with confidence or reliability
Our class’s requirements for Teams

Teammate vs. Partnership

- Common goal
- Mental models
- Subjugate Individual needs (self)
- Interdependence as positive
- Trust / Confidence
- Self awareness

Perception of self awareness
Perspectives on Agency – Leila Takayama

• Agency vs. *perceptions* of agency
  • Turing Test
  • It is perceptions and subjective realities that people make judgements and act upon

• Disconnect between what people consciously perceive and how they respond to stimuli that they may not consciously perceive
Roomba

• Some owners perceive Roomba’s as agentic objects, and others as just plain machines
• 7 out of 14 Roomba owners did not form social relationships with the Roomba in one study (Forlizzi & DiSalvo, 2006)
• 572 out of 760 messages did not contain any descriptions of intimacy felt towards Roombas (Sung, et al., 2007)
Types of Perspective

• “In-the-moment” perspective – one’s most immediate (sometimes visceral) sense in a situation
  • Bottom-up, built from evolved automatic responses to threats and opportunities

• “reflective” perspective – one’s sense of situation upon more distanced cognition and consideration
  • Top-down, by the nature of reflective thought, consciously constructed
Space of Perceived Agency

Reflective

High

In-the-moment

Origin, X=0, Y=0

Low

High

Low
Space of Perceived Agency

- Reflective
- Agentic object seems to be incorporated into oneself
- In-the-moment
- Agentic object seems to be a separate entity
Space of Perceived Agency

<table>
<thead>
<tr>
<th>Reflective</th>
<th>In-the-moment</th>
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<tbody>
<tr>
<td>Low</td>
<td>Low</td>
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<tr>
<td>High</td>
<td>High</td>
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- Agentic object reflectively believed to be a part of oneself
- Agentic object reflectively believed to be a separate entity
Space of Perceived Agency

Reflective

Low

High

In-the-moment

Low

High

Matched In-the-moment and reflective perceptions of agency
Space of Perceived Agency

Things that I reflectively believe are agentic

Things that I reflectively believe are just objects

Things that I reflectively believe are part of me

Things that seem like part of me: Negative agency, in-the-moment

Things that are just there: Low agency, in-the-moment

Things that seem like agents: High agency, in-the-moment
Space of Perceived Agency

- **High Reflective**
  - Ballroom dancing partner
  - Service Worker
  - Autonomously operated Robot
- **Low Reflective**
  - My foot
  - Inert Robot
  - Surprising video image of myself

- **In-the-Moment**
  - My foot that fell asleep
  - Autonomous Robot
  - You

- **Low In-the-Moment**
  - Things that seem like part of me: Negative agency, in-the-moment
  - Things that are just there: Low agency, in-the-moment

- **High In-the-Moment**
  - Things that seem like agents: High agency, in-the-moment

- **Low Reflective**
  - Things that I reflectively believe are agents
  - Things that I reflectively believe are just objects

- **High Reflective**
  - Things that I reflectively believe are part of me

Things that seem like part of me: Negative agency, in-the-moment
Where does your project fall and why?

Reflective

High

Low

In-the-moment

High

Low

Things that I reflectively believe are agentic

Ballroom dancing partner

Service Worker

You

Tele-operated Robot

Inert Robot

Autonomous Robot

My foot

My foot that fell asleep

Surprising video image of myself

Things that I reflectively believe are just objects

Things that I reflectively believe are part of me

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Things that seem like part of me:
Negative agency, in-the-moment

Things that are just there:
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Things that seem like agents:
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Things that seem like part of me:
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Things that are just there:
Low agency, in-the-moment

Things that seem like agents:
High agency, in-the-moment
Agentic Objects

- Agentic objects – entities that are perceived in-the-moment as if they were agentic despite the likely reflective perception that they are just objects (Takayama, 2009)
- People have an innate ability to respond to agentic objects in ways that are very similar to interacting with other humans (Nass & Moon, 2000; Reeves & Nass, 1996)
- Agentic objects inherit both the authority and responsibility of other humans and human institutions
Heider & Simmel
Robotic Agency

• Creating the perception that robots are agentic objects to be interacted with

• Behave in more humanlike ways by developing and/or displaying human-like capabilities such as:
  • Natural eye gaze
  • Joint activity
  • Human-like gesturing behaviors

• Behave more independently (of the observer’s wishes):
  • Disagreeing or acting against the observer’s wishes
  • Physically pushing against you
  • Cheating at a competitive game
Interacting through robots

- Examples:
  - DaVinci robot surgery
  - Walking with an exoskeleton
  - Remote telepresence systems
  - Powered wheelchairs and assistive robot arms

- In-the-moment the robots are incorporated into their own sense of agency, but reflectively are viewed as separate from their bodies and sense of “self”

- Perceive the world through the device rather than perceiving the device itself => “invisible-in-use”
  - Reliably functional, predictable, consistent
  - Low latency in control and feedback
  - Sense of control
Agency in personal robotics

• Is the design focus on interaction or relationship/experience?
  • In-the-moment perceptions more important for influencing interactions
  • Reflective perceptions more important for long-term relationships/experience

• Whose agency matters most?
  • An agentic object for the user to interact with
  • Improve a user’s sense of their own agency

• Not a dichotomy
  • Robot butlers – highly agentic but invisible-in-use
  • Roombas
Mid-semester Course Evaluation

• Katie Walsh – Eberly Center
• 25~30 minute activity
• Anonymous course feedback that will be incorporated this semester
• Kim and I will not be present, but will get a summary of points discussed

• To send additional comments anonymously, please email Katie at kpwalsh@andrew.cmu.edu