

# INTERACTIONS WITH ROBOTS: THE TRUTH WE REVEAL ABOUT OURSELVES

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# CURRENT APPLICATIONS OF SOCIAL ROBOTS

- Service:

- companion robots      Piro, iRobi
- assistance                Cafero, nursing robots, shopping mall robots

- Medicine:

- surgery                     da Vinci surgical system
- therapy                     Robot-assisted recovery and therapy (stroke, ASD)
- nursing                     healthcare robots

- Communication:

- Telerobotics                teleconferencing, telemedicine
- Education                    Nao

[https://www.ald.softbankrobotics.com/sites/aldebaran/files/styles/638x314/public/nao\\_who\\_is\\_nao\\_0.png?itok=X25H1nB6](https://www.ald.softbankrobotics.com/sites/aldebaran/files/styles/638x314/public/nao_who_is_nao_0.png?itok=X25H1nB6)



<http://web.tradekorea.com/product/263/767263/iRobi%20Q-5.jpg>



<http://lynncinnamon.com/wp-content/uploads/2015/12/paro33.jpg>



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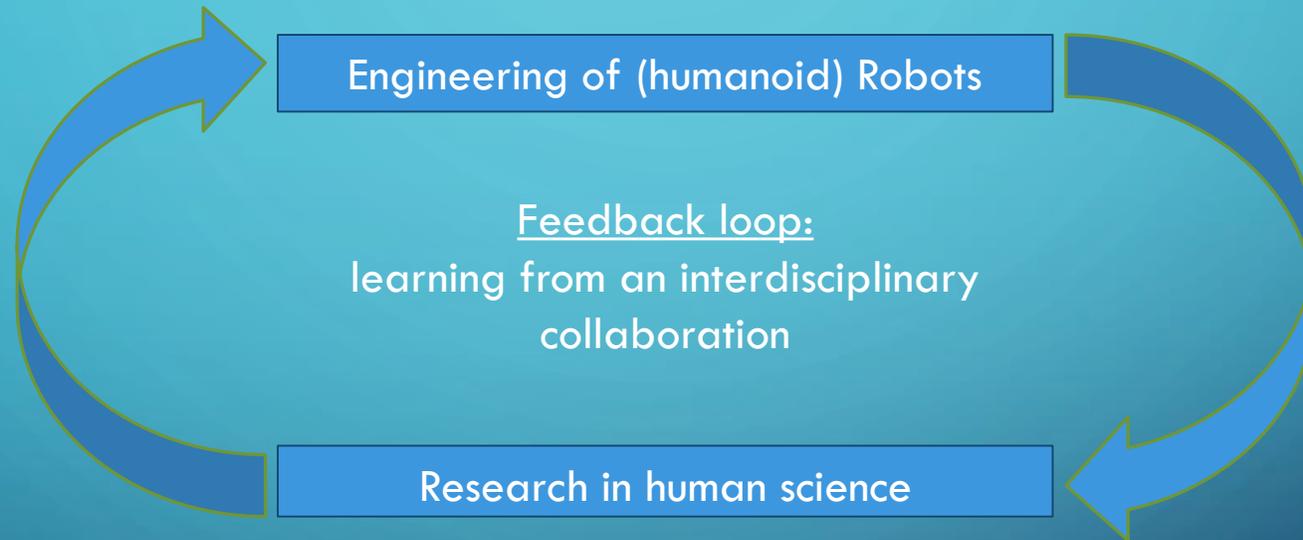
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# CURRENT DIRECTIONS, CONCERNS, AND ETHICAL ISSUES

- Expectations:
  - Reduce healthcare cost (aging society)
  - Create jobs
  - Raise economy
- Concerns:
  - Social impact of technologies (allways-on culture, decreased empathy and closeness, etc.)
  - Robots are (socially) accepted to a certain degree  
(e.g. in healthcare, but robots should not replace humans)
  - Surveillance and privacy (data security, hacking)
- Code of ethics for the use of Robots?

# WHAT MAKING ROBOTS CAN TEACH US ABOUT OURSELVES

- Mimic
- Model of human behavior
- Transfer of methods  
Test models



- Behaviour (social agents)
- Perception (MI)
- Controlled experiments
- Develop models

Win-Win



# STUDYING HOW WE THINK, FEEL, AND BEHAVE TOWARD ROBOTS

- Technical difficulties in creating (humanlike and Pet-like) Robots:
  - Battery power
  - Sensors
  - Language comprehension
  - Understanding of human cognition, emotion and behavior
- Simulated robot studies VS Real-world robot studies



# STUDYING HOW WE THINK, FEEL, AND BEHAVE TOWARD ROBOTS

- Uncanny Valley
  - Robots as social agents
  - Anthropomorphism & Mind Perception
- 
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# UNCANNY VALLEY (*BUKIMI NO TANI GENSHŌ*)

- Masahiro Mori: “like interacting with a dead body”
- Evolutionary theory: protection against infection from diseased bodies
- Conflicting cues:
  - Categorization problem
  - Greater brain activity in the bilateral anterior intraparietal sulcus (action perception system) -> feedback error
- Threat to human uniqueness

# ROBOTS AS SOCIAL AGENTS

- Learning and revealing aspects of our human nature by programming robots
  - “...the engineers and scientists who are programming the brains and behaviors of robots are learning more about models of thought processes and behavior than are the people who are interacting with robots on a surface level.”



<https://assets.pcmag.com/media/images/94113-sony-aibo-ers-7m2.jpg?thumb=y&width=275&height=262>

# ROBOTS AS SOCIAL AGENTS

- Applying social rules to Computers & Robots
  - Social categories as gender, ethnicity, in/out-group status, etc.
  - Empathy
  - emotional attachment
- Physical embodiment:
  - Increased and longer lasting interactions
  - Novelty effect?



<https://assets.pcmag.com/media/images/94113-sony-aibo-ers-7m2.jpg?thumb=y&width=275&height=262>

# ROBOTS AS SOCIAL AGENTS

- Applying social rules to Computers & Robots
  - Abuse of robots

“studying the abuse of robots may allow us to gain insights into human behavior and ways to mitigate the abuse of humans and animals.



<https://assets.pcmag.com/media/images/94113-sony-aibo-ers-7m2.jpg?thumb=y&width=275&height=262>

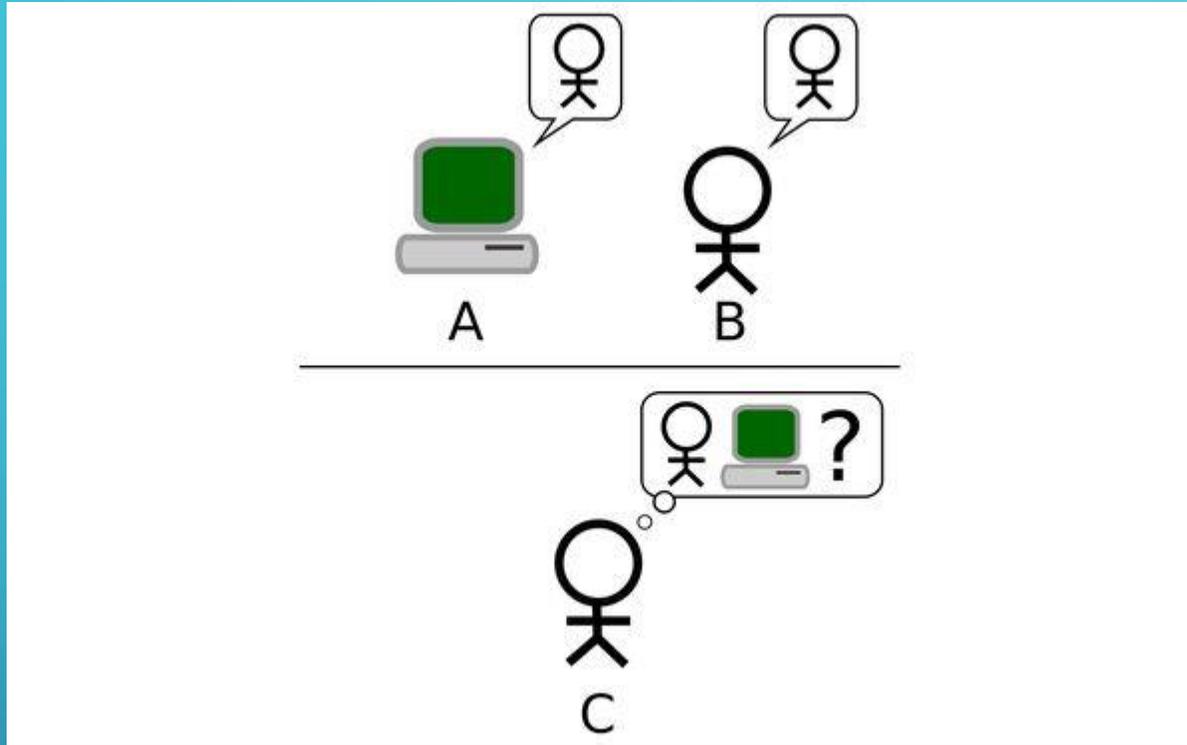
# ANTHROPOMORPHISM & MIND PERCEPTION

- being human is our frame of reference (mirror neurons)
- Factors that influence our tendency to anthropomorphize:
  - Observation of social interaction
  - Human features
  - Uncertainty
  - Loneliness

# ANTHROMORPHISM & MIND PERCEPTION

- Mind Perception:
  - capacity for agency (free will)
  - capacity for experience (Qualia)
- Turing Test

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[https://imgs.xkcd.com/comics/turing\\_test.png](https://imgs.xkcd.com/comics/turing_test.png)

TURING TEST EXTRA CREDIT:  
CONVINCE THE EXAMINER  
THAT HE'S A COMPUTER.

YOU KNOW, YOU MAKE  
SOME REALLY GOOD POINTS.  
/ I'M ... NOT EVEN SURE  
WHO I AM ANYMORE.

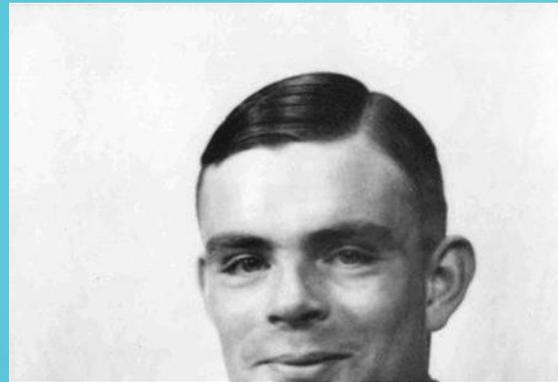


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# CONCLUSION AND FUTURE DIRECTIONS

- **Social Robots:** companionship, therapy, communication, reduce cost in healthcare, etc.
- **Research:** win-win situation: psychologists and engineers can profit and contribute to research on HRI
  - Social behavior
  - Perception
  - E.g. anthropomorphism, empathy, controlled experiments
- **Controversy:** Many open ethical and philosophical questions

# CRITIQUE



<http://www.strangerdimensions.com/wp-content/uploads/2013/11/creepy-girl-uncanny-valley2.jpg>



<https://www.roboticsbusinessreview.com/wp-content/uploads/2016/06/hiroshi2.jpg>

<http://www.strangerdimensions.com/wp-content/uploads/2013/11/creepy-girl-uncanny-valley2.jpg>

# DISCUSSION

- will this research on HRI change science, technology, society, humanity, our world?
- what kind of impact will we see in the next 10-50 years?
- Why do we apply the Intentional stance to computer and robots?
  - Complexity
  - Social robots are designed to behave according to social rules



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