Children and Social Robots: An integrative framework

Jochen Peter

Amsterdam School of Communication Research

University of Amsterdam

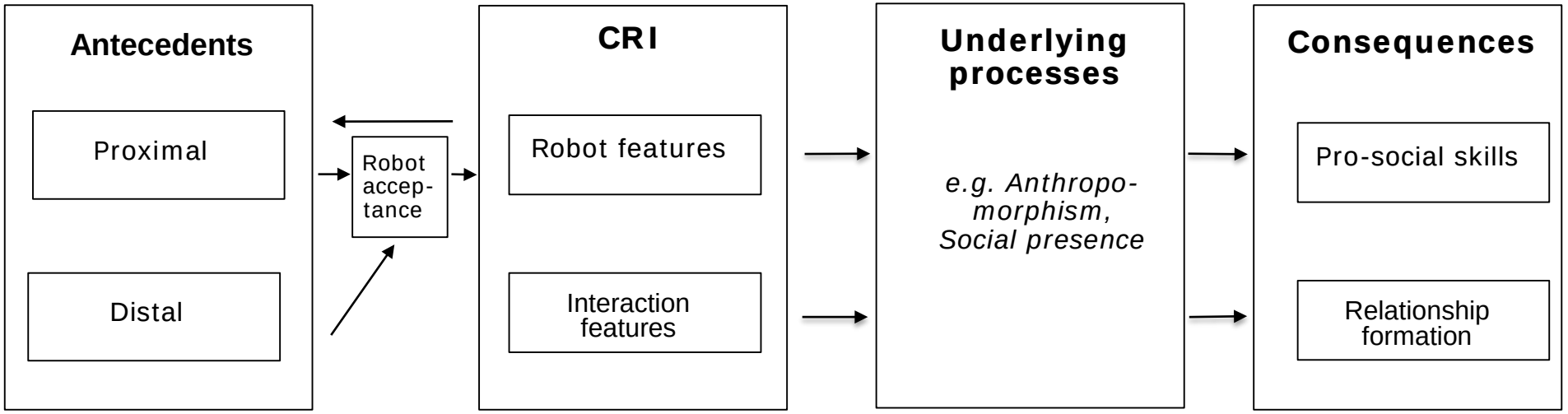
(Funded by ERC Grant 682733, CHILDROBOT)

Goals of the project

Main goal: Integrative framework of child-robot interaction (CRI)

1. Antecedents of children's acceptance of robots
2. Consequences of CRI
3. Underlying processes of CRI

Integrative framework



Technological changes behind 'robotification'

1. Exponential increases in computing power
2. Mobile connectivity
3. Miniaturization of sensors, microphones, and cameras
4. Dataification; networked information
5. Cloud computing
6. Progress in artificial intelligence, machine learning

(e.g., Eberl, 2016; Van Bergen, 2016)

Potential benefits of future developments in AI

- Human-oriented perception: Understanding human gestures and feedback
- Natural human-robot interaction: Peer-like communication between human and robot, adhere to the same social norms
- Readable social cues: Robot convey comprehensible cues to human (e.g., facial expression, gestures)
- Real-time performance: Robot and human interaction rates are synchronized

(*Fong et al., 2003, p. 148)*

Potential problems of future developments in AI

1. Ethics

- Unidirectional emotional relationships (Scheutz, 2012)
- Pushing our 'Darwinian buttons,' manipulation (Scheutz, 2012)
- Loss of relational authenticity (Turkle, 2007, 2011)

2. Privacy (Calo, 2012)

3. Security (Calo, 2012)

Developing AI's potential - scientifically

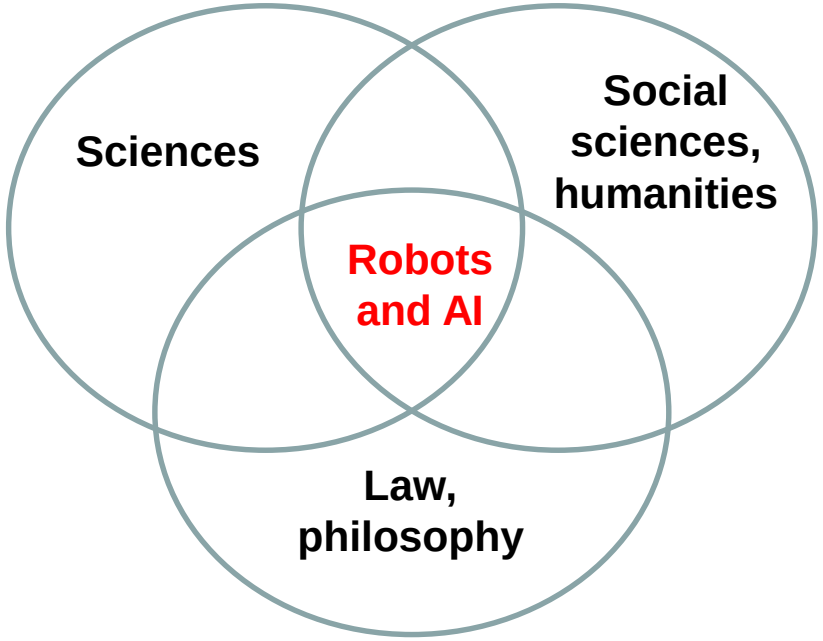
1. Internet of robots: it needs to researched, organized, and regulated how robot knowledge is shared (e.g., Eberl, 2016)
2. Naturalization: from speech to vision (e.g., Van Bergen, 2016)
3. Indexical nature of communication: deriving meaning of an expression from particular situation (Zhao, 2006)

Developing AI's potential - societally

1. "Robots should be designed and operated to comply with existing law, including privacy" (p. 126)
2. "Robots are products: as with other products, they should be designed to be safe and secure" (p. 126)
3. "Robots are manufactured artefacts: the illusion of emotions and intent should not be used to exploit vulnerable users" (p. 127)
4. "It should be possible to find out who is responsible for any robot" (p. 127)

(quoted from: Boden et al., 2017)

Multidisciplinarity: Links to other disciplines



Timeline: Where's my area headed with regard to AI?

Assuming that ethical challenges can be addressed, if possible by empirical evidence:

- Advanced, stable speech recognition (Van Bergen, 2016)
- Robot vision (Van Bergen, 2016)
- Gestures, non-verbal cues
- Main challenge: reliable and stable combination of AI-based software and hardware

References

Literature:

Boden, M., Bryson, J., Caldwell, D., Dautenhahn, K., Edwards, L., Kember, S., … Winfield, A. (2017). Principles of robotics: Regulating robots in the real world. *Connection Science*, *29*(2), 124–129. http://doi.org/10.1080/09540091.2016.1271400

Calo, M. R. (2012). Robots and privacy. In P. Lin, K. Abney, & G. A. Bekey (Eds.), *Robot Ethics: The ethical and social implications of robotics* (pp. 187–202). Cambridge, MA: MIT Press.

Eberl, U. (2016). *Smarte Maschinen. Wie kuenstliche Intelligenz unser Leben veraendert [Smart machines. How artificial intelligence changes our lives].* Munich, Germany: Hanser.

Fong, T., Nourbakhsh, I., & Dautenhahn, K. (2003). A survey of socially interactive robots. *Robotics and Autonomous Systems*, *42*(3–4), 143–166. http://doi.org/10.1016/S0921-8890(02)00372-X

Scheutz, M. (2012). The inherent dangers of unidirectional emotional bonds between humans and social robots. In P. Lin, K. Abney, & G. A. Bekey (Eds.), *Robot Ethics: The ethical and social implications of robotics* (pp. 204–222). Cambridge, MA: MIT Press.

Turkle, S. (2007). Authenticity in the age of digital companions. *Interaction Studies*, *8*(3), 501–517.

Turkle, S. (2011). *Alone together: Why we expect more from technology and less from each other*. New York: W. W. Norton & Company.

Van Bergen, W. (2016). *De robots komen eraan! Feit en fictie over de toekomst van intelligente machines [The robots are coming! Fact and fiction about the future of intelligent machines]*. Amsterdam/ Antwerp: Business Contact.

Zhao, S. (2006). Humanoid social robots as a medium of communication. *New Media & Society*, *8*(3), 401–419.

Image (no changes made to image):

Slide 2: “NAO Robot” by Softbank Robotics Europe, downloaded from https: //commons.wikimedia.org/wiki/File:NAO_Robot_.jpg, licensed under the Creative Commons Attribution-Share Alike 4.0 International license