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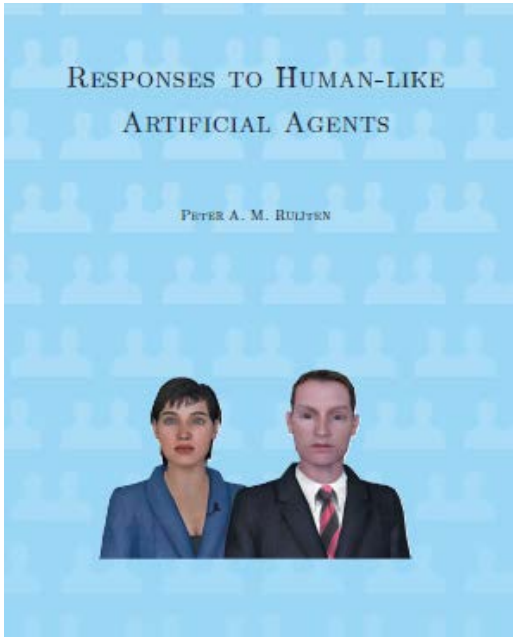
On the Perceived Human-likeness of Virtual Health Agents

Towards a Generalized Measurement of Anthropomorphism

- Peter Ruijten
- Teacher (researcher) in the Human-Technology Interaction group
- Dissertation about responses to human-like artificial agents, with a focus on sustainable behavior
- Main interests are
  - Anthropomorphism
  - Human-robot interaction
  - Human-agent interaction
  - Measurement



- Introduction
  - Why perceptions of virtual health agents are important
- Anthropomorphism
  - Conceptualization and operationalization
- The Rasch model
  - As a way of analyzing empirical data
- Applications
  - To test the suitability of the Rasch model
- Conclusions
  - Future use of the method for measuring people's perceptions of virtual health agents

- Intelligent virtual agents
  - Interactive characters with human-like abilities
  - Available at any time and place
  - Contribute to affordable and accessible health care

- People's perceptions are crucial
  - Often designed to resemble humans
  - This can have negative effects on their effectiveness









- Various interpretations and corresponding operationalizations
  - Person vs Agent
  - Experiences vs Expectations
  - Explicit vs Implicit Measurement

- Measurement mostly focused on *extent* to which a characteristic is attributed

Does the virtual health agent have consciousness?

not at all — very much

|---------|---------|---------|---------|---------|---------|

no ○ yes ○

- Conceptualization:
  - Unconscious process
  - Whether or not *any* human-like characteristic is attributed
  - ‘In the eye of the beholder’
  - Triggered by both psychological and design attributes

$$\ln\left(\frac{P(x_{ni}=1)}{1-P(x_{ni}=1)}\right)=\theta_n-\delta_i$$

i = a human-like characteristic

n = a person

θ_n = a person's disposition to anthropomorphize

δ_i = the difficulty to ascribe an item to an IVA

- Assumptions of the model
  - Person with a higher predisposition has a higher chance of attributing any human-like characteristic
  - All people are expected to have a higher chance of attributing an item low in human-likeness than an item high in human-likeness
  - All items can be modeled on a single dimension: human-likeness

- These assumptions match our conceptualization and the model can thus be used for *analyzing* data

- List of items created:
  - Experience pain
  - Unhappy about moral dilemma
  - Imaginative
  - Angry
  - Empathize
  - Happy
  - Chose moral dilemma
  - Satisfied
  - Responsible
  - Free will
  - Understand emotions
  - Ambitious
  - Understand moral dilemma
  - Recognize emotions
  - Intention not to harm others
  - Think about moral dilemma
  - Self-conscious
  - Jump
  - Deliberate perform action
  - Talk
  - Solve riddles
  - Recognize voices
  - Understand language
  - Rational
  - See depth
  - Anticipate on environment
  - Conscious about environment
  - Detect color
  - Purposeful
  - Calculate
  - See
  - Organized
  - Estimate distances
  - Pick up objects
  - Walk
  - Detect objects
  - Avoid objects

- Data used from three studies
  1. Comparison with similar attributes
  2. Comparison with other measurements
  3. Comparison between different agents

- Coherence between studies was very high
  - Human-like characteristics ordered from low to high in perceived humanness in all studies

STUDY 1

- Haslam (2008): humanness has two distinct senses, human nature and human uniqueness

- Comparison with similar attributes
  - Difficulty & human nature (r = .60, p < .001)
  - Difficulty & human uniqueness (r = .44, p < .01)
  - Human nature & human uniqueness (r = .71, p < .001)

STUDY 2

1 { Consciousness

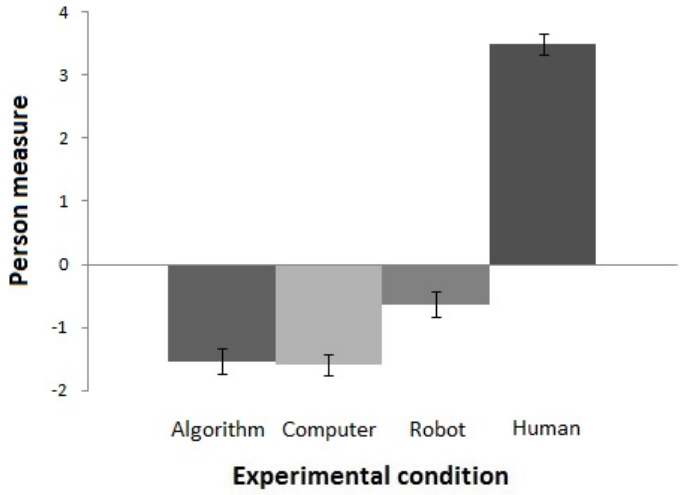
Experience emotions

2 { See depth

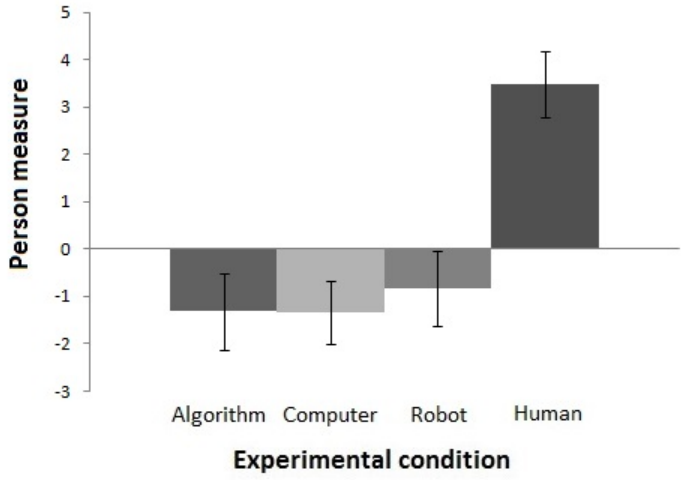
Detect objects

STUDY 3

- When all items included



- When three misfitting items are excluded



- Perceptions of human-likeness are crucial
- Rasch model is able to map responses to human-like agents in a reliable and valid way
- Next step: creating a list of items for use with virtual health agents
  - Maybe you have any ideas to help me with this

Thank you.

- Points for discussion
  - Is anthropomorphism relevant in the development of virtual health agents?
  - Do you agree with the conceptualization and the method of measuring anthropomorphism?
  - What items are missing to accommodate virtual health agents?
  - What should be the next step in this line of work for it to aid the IVA community?
  - Any other thoughts or comments?