AI-Based Business Information Systems

AI-Enabled Engagement

Prof. Dr. Ulrich Gnewuch

Course Organization

Lecture

AI-Enabled Business Capabilities

- AI-Enabled Innovation
- AI-Enabled Insights & Decisions
- **AI-Enabled Engagement**
- AI-Enabled Automation

AI Technologies & Trends

- AI Ethics & Responsible AI
- Generative AI
- Explainable AI
- Conversational AI

Foundations

- Introduction to AI in Business & Information Systems
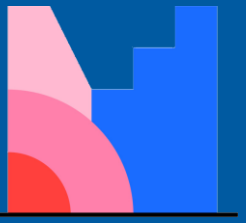- Design & Management of AI-Based Information Systems

Exercise

- **Exercise 4:** Generative AI & Innovation
- **Exercise 3:** Explainable AI Techniques
- **Exercise 2:** Human-Centered Chatbot Design
- **Exercise 1:** Robotic Process Automation Case Study

Industry Talk
ZF Group

RECAP FROM LAST LECTURE:

- What are examples of <u>software</u> robots?

- Please organize the task types in the Theory of AI Job Replacement based on the order in which AI is expected to perform them.

- What are key challenges and risks of AI-enabled automation?

Learning Goals

- Explain the concept of user engagement and its three dimensions

- Describe how AI can enable user engagement through human-like interactions

- Explain the relationship between social cues and social responses

- Discuss the benefits and risks of AI-enabled engagement and human-like AI

What does "Engagement" mean?

engage¹ 🔊

verb (used with object), *en·gaged, en·gag·ing.*

1   to occupy the attention or efforts of (a person or persons):
    He engaged her in conversation.
    Synonyms: involve, interest, engross, absorb

2   to secure for aid, employment, use, etc.; hire:
    to engage a worker;
    to engage a room.
    Antonyms: discharge

3   to attract and hold fast:
    The novel engaged her attention and interest.

4   to attract or please:
    His good nature engages everyone.

https://www.dictionary.com/browse/engage

Types of Engagement

- Engagement with …
  - a company and its products
  - an employer
  - a technology
  - …

Customer Engagement

Employee Engagement

User Engagement

Customer Engagement

Customer engagement is the intensity of an individual's participation in and connection with a company's offerings and/or activities.

- Higher levels of customer engagement increase customer loyalty and purchase frequency, resulting in better overall business performance

- Engaged customers are more likely to share positive experiences and recommend products or services to others

- Fostering customer engagement is in the best interest of a company and should be actively encouraged

WE JUST WANT TO TRACK YOUR CUSTOMER JOURNEY SO THAT WE CAN ENGAGE WITH YOU BETTER.

Vivek et al. 2012

Employee Engagement

Employee engagement refers to employees' willingness to fully invest themselves physically, cognitively, and emotionally into their work roles.

- The outcomes of high employee engagement are improved productivity, loyalty, job satisfaction, and organizational performance

- A positive workplace culture, recognition, and opportunities for autonomy and growth foster employee engagement
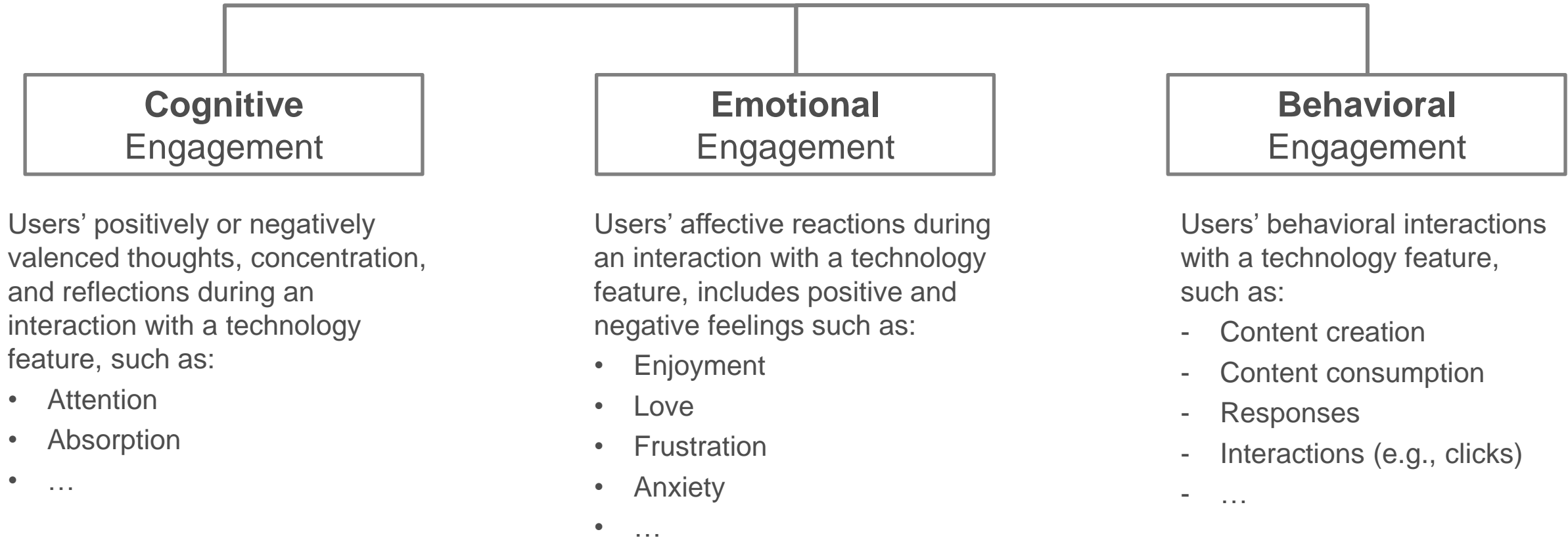

Kahn 1990

User Engagement

User engagement is defined as a user's technology-related state of mind characterized by specific cognitive, emotional, and behavioral manifestations during interactions with technology.

- User engagement is positively related to user satisfaction, loyalty, and usage frequency

- Engaged users are more likely to contribute to user-generated content and to demonstrate a strong emotional connection to the technology

- User engagement has three subdimensions: cognitive, emotional, and behavioral engagement

➡ **Our focus is on user engagement**

Lehrer et al. 2023

Dimensions of User Engagement

Cognitive Engagement	**Emotional** Engagement	**Behavioral** Engagement

Cognitive Engagement

Users' positively or negatively valenced thoughts, concentration, and reflections during an interaction with a technology feature, such as:

- Attention
- Absorption
- …

Emotional Engagement

Users' affective reactions during an interaction with a technology feature, includes positive and negative feelings such as:

- Enjoyment
- Love
- Frustration
- Anxiety
- …

Behavioral Engagement

Users' behavioral interactions with a technology feature, such as:

- Content creation
- Content consumption
- Responses
- Interactions (e.g., clicks)
- …

Lehrer et al. 2023

Behavioral Engagement: Example

LinkedIn Pages Performance Summary

Impressions	Engagements
17.5k ↗ **7%**	**775** ↗ **43%**

Post Clicks	Engagement Rate
224 ↗ **51%**	**15%** ↗ **9.2%**

Audience Growth

Net Follower Growth Breakdown, by Day
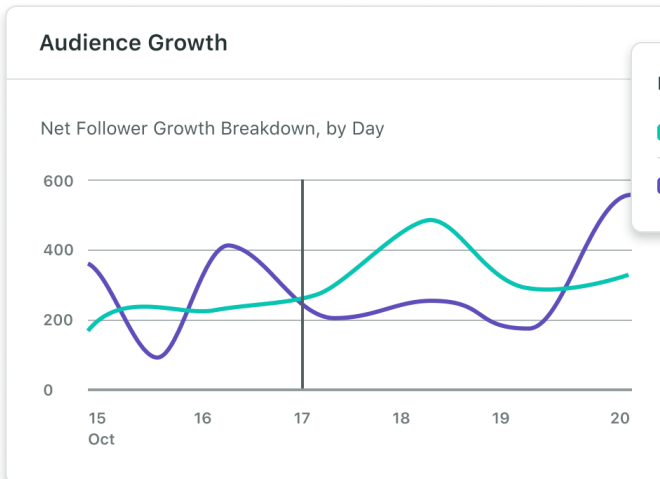
Monday, Oct 17, 2022 UTC

	Followers	275
	Net Follower Growth	221

Social Media

Cognitive Engagement: Example

Netflix CEO Reed Hastings: Sleep Is Our Competition

For Netflix, the battle for domination goes far beyond which TV remote to pick up.

Constant craving: how digital media turned us all into dopamine addicts

According to addiction expert Dr Anna Lembke, our smartphones are making us dopamine junkies, with each swipe, like and tweet feeding our habit. So how do we beat our digital dependency?

D r Anna Lembke, a world-leading expert on addiction, is concerned about my "phone problem". During our interview I confess, in passing, to having an unhealthy attachment to my iPhone, checking it every few minutes like a compulsive tic (sound familiar?) Lembke is having none of it. She wants me to abstain from using it for at least 24 hours by locking it in a drawer and going out. The first 12 hours will be filled with anxiety and Fomo, but as time unfolds, I'll experience a sense of "real freedom", will gain insight into my relationship with my digital companion and will "resolve to get back to using it a little differently", she says, speaking with a soothing yet firm tone.

https://www.fastcompany.com/40491939/netflix-ceo-reed-hastings-sleep-is-our-competition

https://www.theguardian.com/global/2021/aug/22/how-digital-media-turned-us-all-into-dopamine-addicts-and-what-we-can-do-to-break-the-cycle

Emotional Engagement: Example

https://www.youtube.com/watch?v=DTq0MaOwTjE

https://replika.com/

How can AI enable user engagement?

AI-Enabled Engagement

> AI-enabled engagement refers to the use of AI to create interactions that resemble those with a human.

- Users consider technologies with a human-like interface to be more engaging than other interfaces that perform the same functions

- AI can be used to provide highly human-like experiences
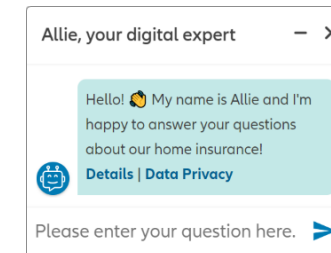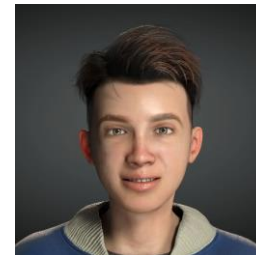
Benbya et al. 2021; Lankton et al. 2015
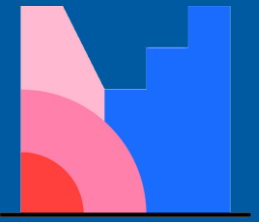
What characterizes interactions between humans? What makes an experience "human-like"?

Social Cues in Human-Human Interaction

- In human-human interaction, a person perceives, interprets, and responds to a wide array of social cues:
  - Facial expressions (e.g., smiling)
  - Gestures (e.g., head nodding)
  - German forms of address (e.g., Du vs. Sie)
  - …

- Social cues help to clarify people's meanings and intentions

- Social cues influence various social processes (e.g., communication)

Gaze

Head position

Vocal behavior

Body posture

Body posture

Interpersonal distance   Gesture

Burgoon et al. 2010

Social Cues in Human-AI Interaction
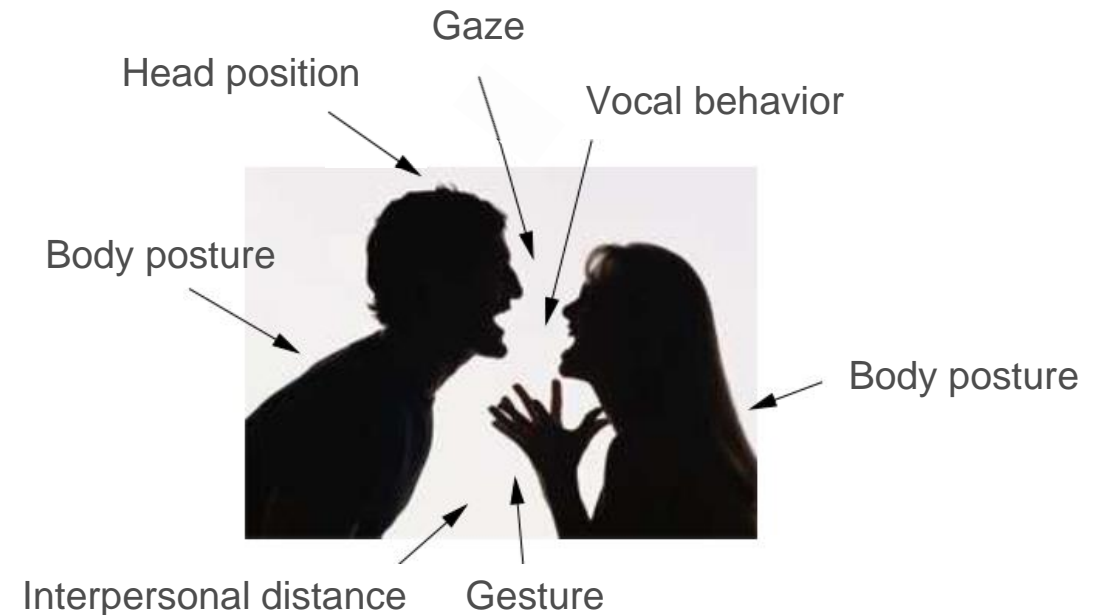
- Users perceive social cues from technology in a similar way:

Cues	Examples
Physical	Face, eyes, body, movement
Language	Interactive language use, spoken language, language recognition
Psychological	Preferences, humor, personality, feelings, empathy, "I'm sorry"
Social Dynamics	Turn taking, cooperation, praise for good work, answering questions, reciprocity
Social Roles	Doctor, teammate, opponent, teacher, pet, guide

Get ready for creepy AI robots with human facial expressions

Tableau Ask Data Helps Humans 'Talk' To Data

Your Chatbot's Personality Is The Key

Does ChatGPT Give the Same Answer to Everyone?

Alexa, Will You Be My Friend? When Artificial Intelligence Becomes Something More

Fogg 2002

Example: Physical Cues
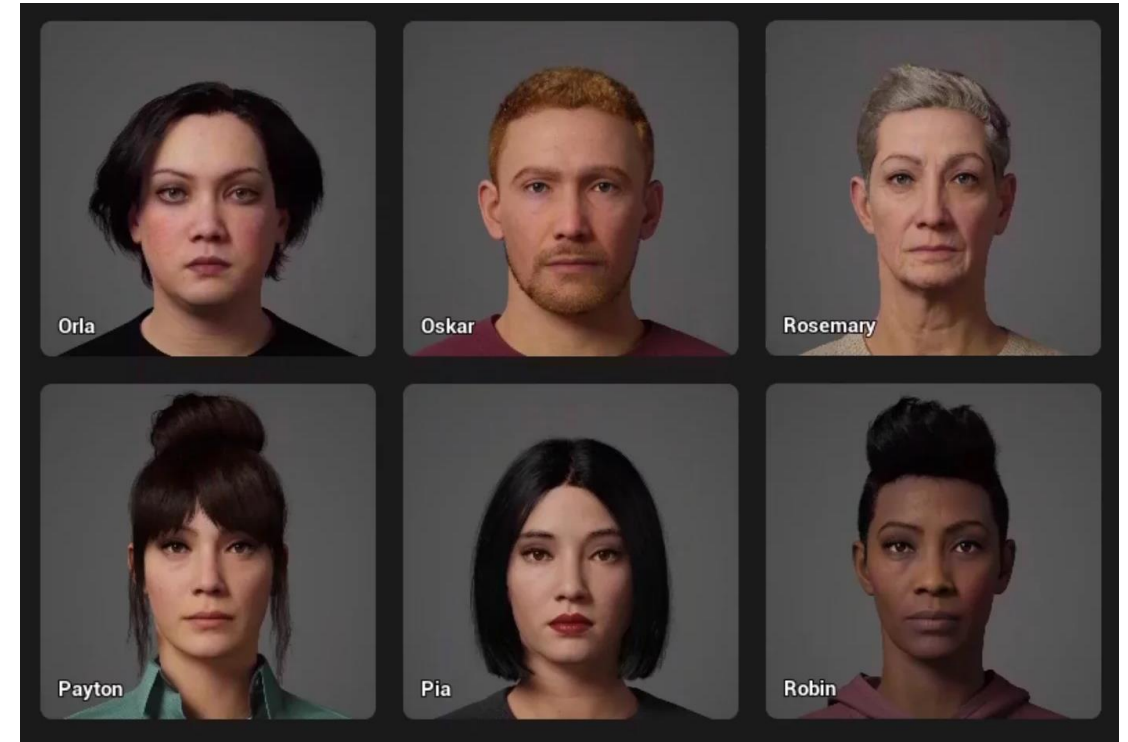
➡️ Realistic 3D avatars with human faces and body movements

Example: Language Cues
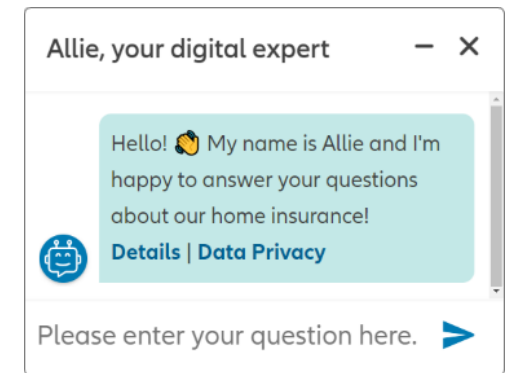
➡️ Chatbots and voice assistants that converse with us via natural language

→ Conversational AI Lecture

Example: Social Role Cues

Asana's new 'AI teammate' can tell people what to do at work / Instead of just showing who has been assigned what task, now Asana says its AI tool can do the assigning or reach out to fill in missing information.

> Asana's platform already helps teams lay out tasks and see who is assigned which responsibilities, and now it says "AI teammates" will step in with advice and plans for who should work together to get things done.

https://www.theverge.com/2024/6/5/24170480/asana-ai-teammate-workflow-assistant-chatbot

Can AI curb loneliness in older adults? This robot companion is proving it's possible

For users of ElliQ, 95% said that it helped reduce their loneliness and improve their well-being. Could it help your loved one?

If you walked into Marie Defrancesco's New York home, you would find an 82-year-old woman living completely alone. With no other people or pets around, you might believe that Marie has no one to interact with.

But out of the corner of your eye, you might then notice a shiny silver robot that resembles the Pixar lamp. It moves its head, faces you, lights up, and strikes up a conversation. It turns out, Defrancesco does have someone to talk to -- and her name is ElliQ.

https://www.zdnet.com/article/can-ai-curb-loneliness-in-older-adults-this-robot-companion-is-proving-its-possible/

➡️ AI designed to take on specific roles such as teammate, companion, doctor, etc.

Digital Humans – The Future of AI-Enabled Engagement?

https://www.youtube.com/watch?v=S3F1vZYpH8c
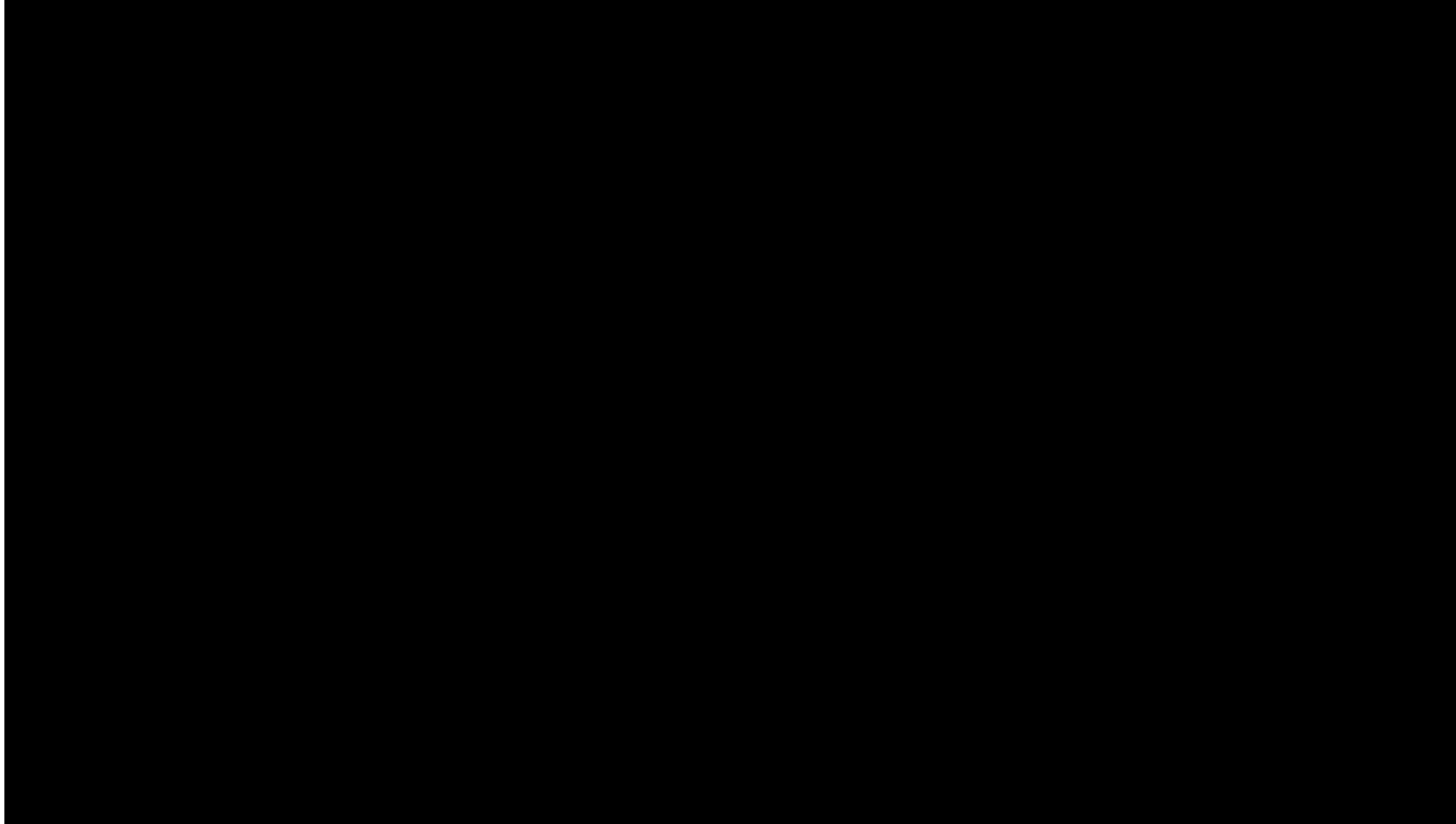
Social Responses:

How do social cues lead to human-like interactions with AI?

Clifford Nass

Youngme Moon

Nass et al. 1994; Nass & Moon 2000

Social Response Theory
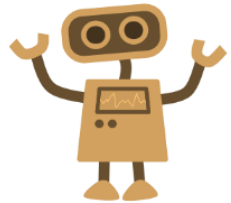
Social Cues

A technology possesses characteristics normally associated with humans

trigger

Mindless Behavior

Application of various scripts, labels, and expectations in accordance with prior experiences

result in

Social Responses

Emotional, cognitive, or behavioral reactions similar to reactions shown during interactions with humans

Nass et al. 1994, Nass & Moon 2000

Example #1
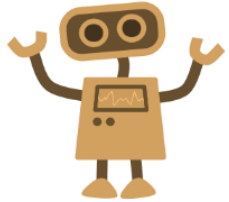
| Social Cues | Mindless Behavior | Social Responses |

Name tag of a chatbot ("Emma" vs. "ChatBotX")

People have names → Chatbot "Emma" appears more like a real person

Chatbot "Emma" is more likeable, sociable, and friendly than "ChatBotX"

Araujo 2018

Example #2

UNIVERSITY
OF PASSAU
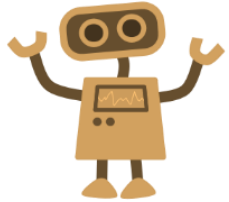
Social Cues

Mindless Behavior

Social Responses

Male vs. female voice output of a computer

Gender attribution to computer

Gender stereotypes:
- Male-voiced computer = more informative about computers
- Female-voiced computer = more informative about love and relationships

Nass et al. 1997

1997?

Nass, C., Moon, Y., & Green, N. (1997). Are machines gender neutral? Gender-stereotypic responses to computers with voices. *Journal of Applied Social Psychology*, *27*(10), 864–876.

Female voice assistants fuel damaging gender stereotypes, says a UN study

"Most AI voice assistants are gendered as young women, and are mostly used to answer questions or carry out tasks like checking the weather, playing music, or setting reminders. This sends a signal that women are docile, eager-to-please helpers without any agency, always on hand to help their masters, helping to reinforce harmful stereotypes."

UNESCO (https://unesdoc.unesco.org/ark:/48223/pf0000367416.locale=en),
https://www.technologyreview.com/2019/05/22/65758/female-voice-assistants-fuel-damaging-gender-stereotypes-says-un-study

Challenges of AI-Enabled Engagement and Human-Like AI

"*I have noticed that, in climbing toward the goal of making robots appear human, our affinity for them increases until we come to a valley, which I call the* **uncanny valley**.*"*

Example: A robot that looks almost human but certain features are not quite right

Mori 1970

Uncanny Valley Theory

- Mori (1970) proposed a **nonlinear relation** between a character's degree of human-likeness and the human perceiver's emotional response

- The **dip in emotional response just before total human-likeness** is referred to as the uncanny valley
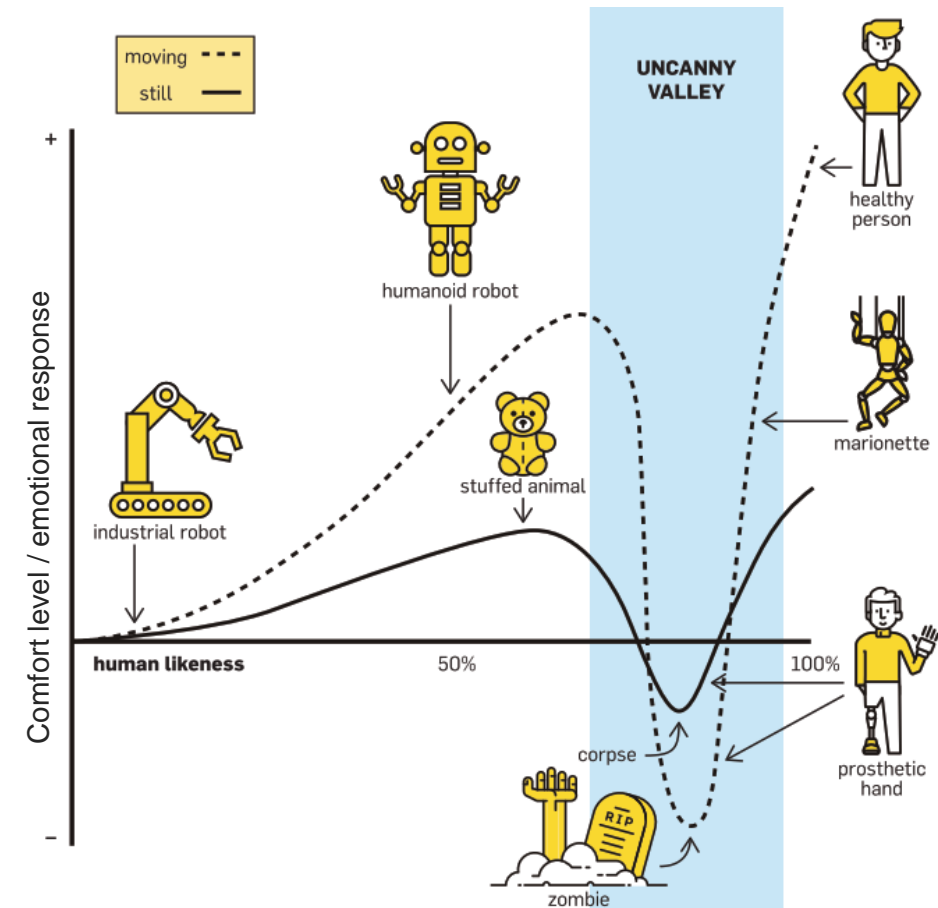
Mori 1970; Mone 2016

- Small deviations from humanness can make a big difference

- This not only includes visual cues or physical appearance but also language (e.g., computer-generated voices)

- Businesses should stay out of the uncanny valley

- Researchers can explore and push the boundaries of human-likeness

Ethical Questions
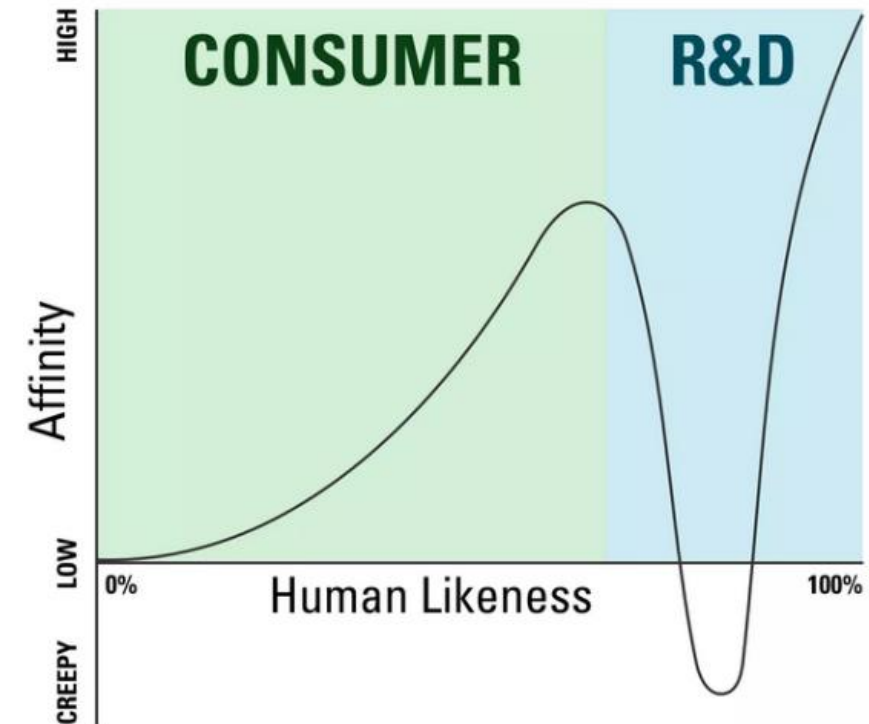
Should AI use social cues to look and act like a human?

How human should a robot or avatar be?

Should people know that they are interacting with AI instead of a human?

What happens when we finally cross the uncanny valley?

Will artificial human-likeness endanger our "real" humanness long term?

Benefits of Human-Like AI

"In 1950, Alan Turing proposed an "imitation game" as the ultimate test of whether a machine was intelligent: could a machine imitate a human so well that its answers to questions are indistinguishable from those of a human. Ever since, creating intelligence that matches human intelligence has implicitly or explicitly been the goal of thousands of researchers, engineers and entrepreneurs. **The benefits of human-like artificial intelligence include soaring productivity, increased leisure, and perhaps most profoundly, a better understanding of our own minds."**

https://digitaleconomy.stanford.edu/news/the-turing-trap-the-promise-peril-of-human-like-artificial-intelligence/

*"Fundamentally, **whatever human-likeness we create on machines is not genuine humanness** because it lacks the physical characteristics of our body and the self-awareness that only occur in our biology."*

Porra et al. 2020
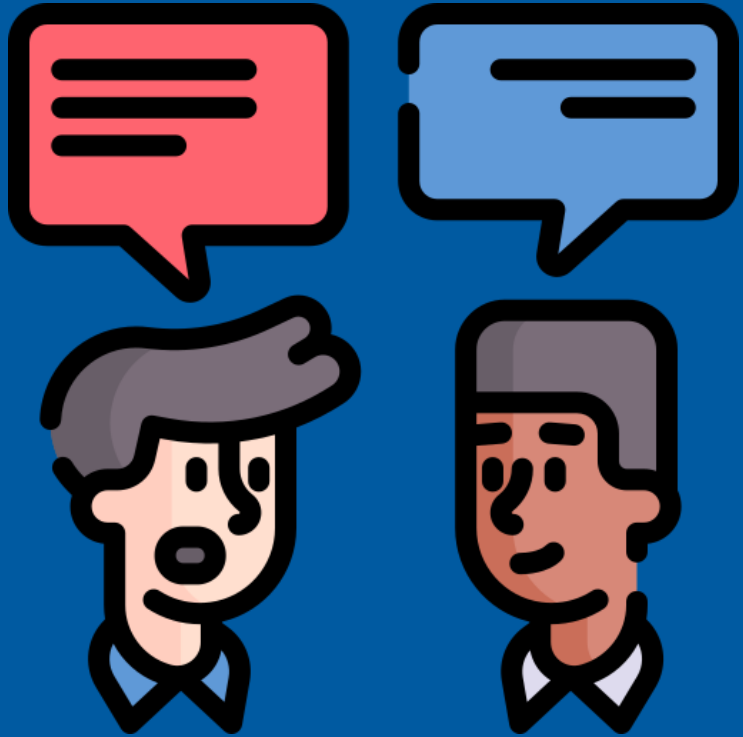
Your View on Human-Like AI

Should AI be designed to resemble and behave like humans? Why or why not? Should there be any limitations or ethical boundaries, and if so, what are the reasons for them? What do you think are the long-term consequences for humanity?

→ Discuss these questions with a partner for **~5 minutes** and be ready to share your opinions

Key Takeaways From This Lecture

- Engagement describes the depth of interaction and connection users have with a technology

- Technologies with a human-like interface are more engaging than other interfaces that perform the same functions

- AI can be used to provide highly human-like experiences through social cues: physical appearance, natural language, social roles, …

- Social cues automatically trigger social responses from humans and thereby influence human behavior

- "Almost-human" AI can easily fall into the uncanny valley

- There is an ongoing debate about whether or not AI should be designed to resemble and behave like humans

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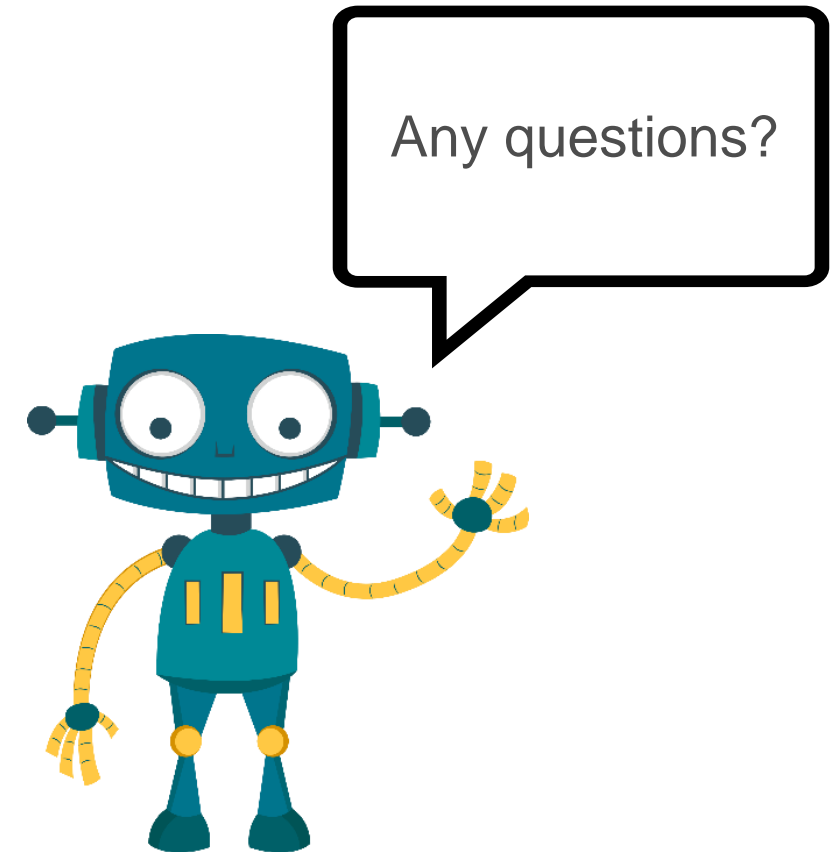
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