

AI-Based Business Information Systems

AI-Enabled Engagement



Prof. Dr. Ulrich Gnewuch

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

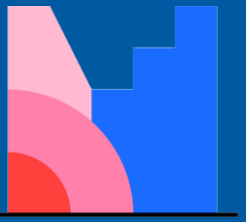
Exercise 4:
Generative AI &
Innovation

Exercise 3:
Explainable AI
Techniques

Exercise 2:
Human-Centered
Chatbot Design

Exercise 1:
Robotic Process
Automation Case Study

Industry Talk
ZF Group



Mentimeter



RECAP FROM LAST LECTURE:

- What are examples of software 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?



- 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

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>

- Engagement with ...

- a company and its products
- an employer
- a technology
- ...



Customer
Engagement

The diagram consists of three orange rectangular boxes arranged vertically on the right side of the slide. Each box contains text. From the list of engagement types on the left, three arrows point to these boxes: an orange arrow from 'a company and its products' to 'Customer Engagement', another orange arrow from 'an employer' to 'Employee Engagement', and a red arrow from 'a technology' to 'User Engagement'.

Employee
Engagement

User
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



Vivek et al. 2012



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 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**

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
- ...

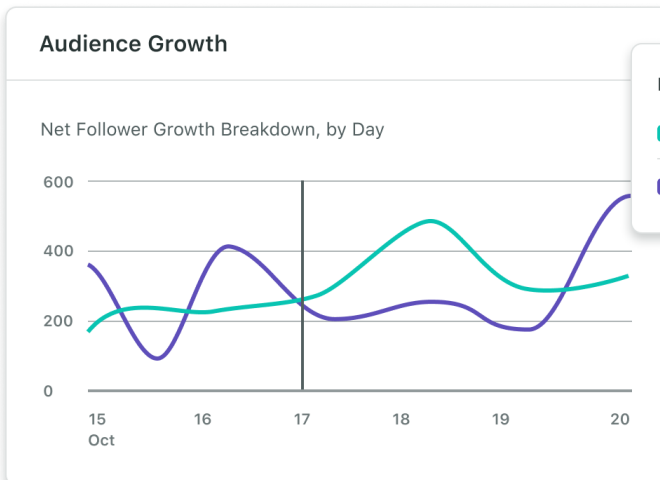
Behavioral Engagement

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

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

Behavioral Engagement: Example

LinkedIn Pages Performance Summary			
Impressions		Engagements	
17.5k ↗ 7%		775 ↗ 43%	
Post Clicks		Engagement Rate	
224 ↗ 51%		15% ↗ 9.2%	



Social Media

Netflix CEO Reed Hastings: Sleep Is Our Competition

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



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

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?

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



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



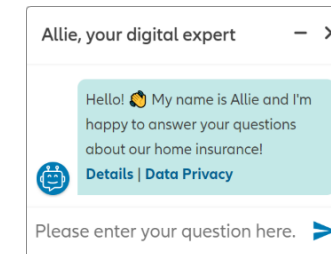
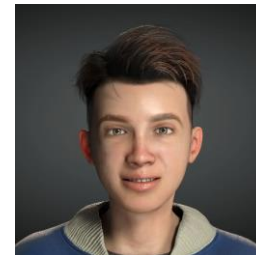
<https://replika.com/>

How can AI enable user engagement?

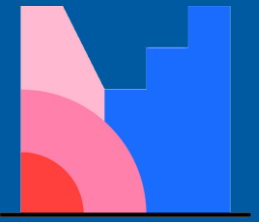


AI-enabled engagement refers to the use of AI to create interactions that resemble those with a human.

- 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

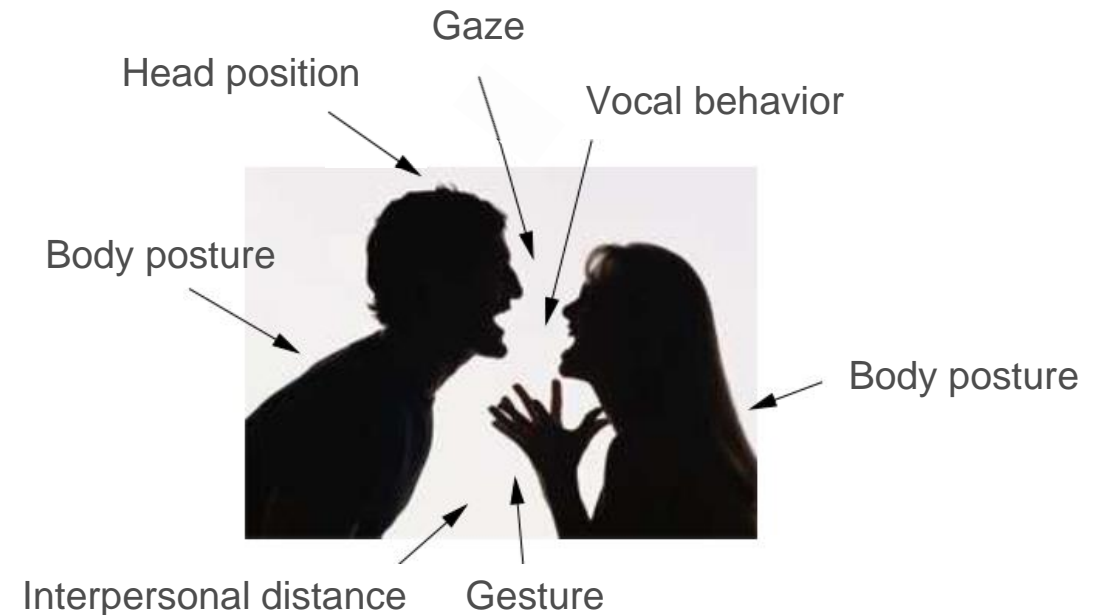


Mentimeter



What characterizes interactions between humans? What makes an experience “human-like”?

- 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)



Burgoon et al. 2010

- Users respond in a similar way to social cues from technology:

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

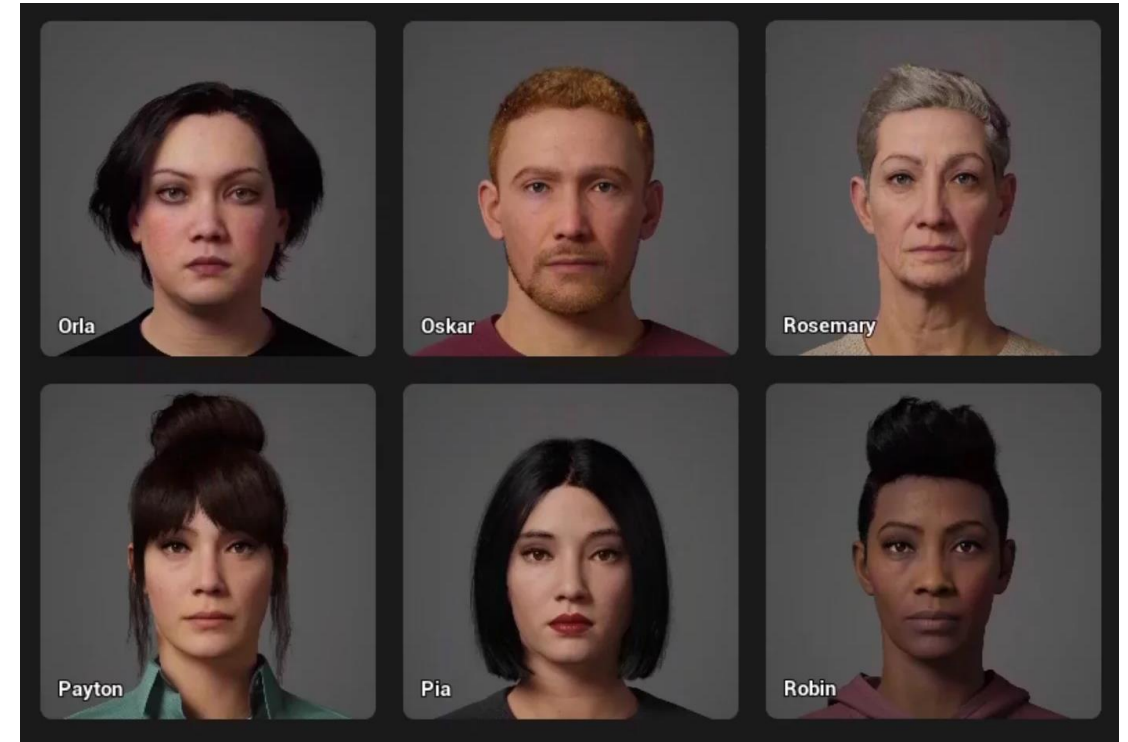
Your Chatbot's Personality Is The Key

Does ChatGPT Give the Same Answer to Everyone?

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

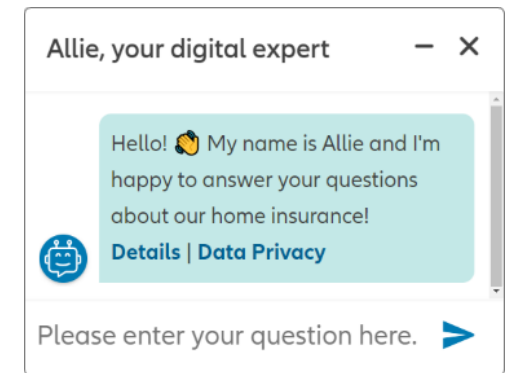
Fogg 2002

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

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>



AI designed to take on specific roles such as teammates, companions, doctors, etc.

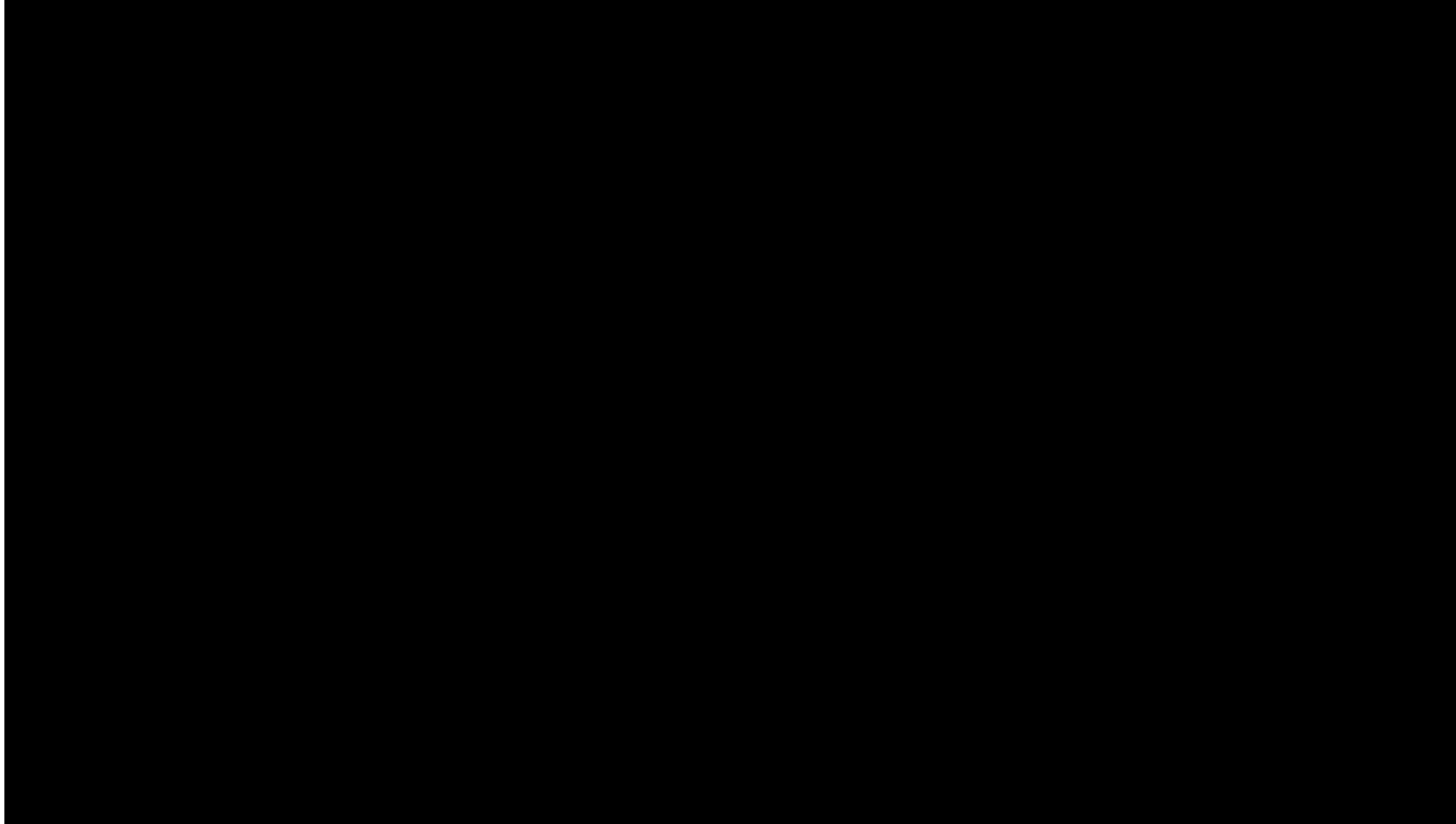
Can AI curb loneliness in older adults? This robot companion is proving it's possible

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/>



<https://www.youtube.com/watch?v=S3F1vZYpH8c>

Social Responses:

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



Computers are Social Actors

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ABSTRACT

This paper presents a new experimental paradigm for the study of human-computer interaction. Five experiments provide evidence that individuals' interactions with computers are fundamentally social. The studies show that social responses to computers are not the result of conscious beliefs that computers are human or human-like. Moreover, such behaviors do not result from users' ignorance or from psychological or social dysfunctions, nor from a belief that subjects are interacting with programmers. Rather, social responses to computers are commonplace and easy to generate. The results reported here present numerous and unprecedented hypotheses, unexpected implications for design, new approaches to usability testing, and direct methods for verification.

KEYWORDS: Anthropomorphism, Agents, Voice, Speech, Social Psychology, Gender, Design

INTRODUCTION

What can we learn about human-computer interaction if we show that the human-computer relationship is fundamentally social? What can we predict and test if we assume that individuals are biased toward a social orientation; that when people sit down at a computer, they interact socially?

The present research provides a wide range of experimental evidence that a limited set of characteristics associated with humans provides sufficient cues to encourage users to exhibit behaviors and make attributions toward computers that are nonsensical when applied to computers but appropriate when directed at other humans. Thus, we demonstrate that users can be induced to elicit a wide range of social behaviors, even though users know that the machines do not actually possess feelings, "selves," genders, or human motivations.

The approach is as follows:

1. Pick a social science finding (theory and method) which concerns behavior or attitude toward humans. The studies presented here draw from social psychology and sociology.

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2. Change "human" to "computer" in the statement of the theory.
3. Replace one or more humans with computers in the method of the study.
4. Provide the computer with characteristics associated with humans: (a) language output [1]; (b) responses based on multiple prior inputs [2]; (c) the filling of roles traditionally filled by humans [3]; and (d) the production of human-sounding voices [4,5,6,7].
5. Determine if the social rule still applies.

In this paper, we report successful application of our approach in five studies. The first study answers the question, "Will users apply politeness norms to computers?" The second study answers the question, "Will users apply the notions of 'self' and 'other' to computers?" The third study answers the question, "On what basis do users distinguish computers as 'self' or 'other' — the voice or the box?" The fourth study answers the question, "Will users apply gender stereotypes to computers?" Finally, the fifth study answers the question, "If people do respond socially to computers, is it because they feel that they are interacting with the computer or with some other agent, such as the programmer?" and, "Who or what do users think of when the a computer says 'I'?"

In sum, the basic question in the present studies, and a question that has not previously been answered, is, "Which social rules will people apply to computers?" A subsidiary question is how powerful are the rules; that is, can one easily generate these responses or do they only occur rarely?

A crucial point about this research is that all of these studies involve experienced computer users. Thus, none of the subjects' responses resulted merely from the novelty of using a computer, or from some misunderstanding or fallacious belief about the capabilities of computers. [8]

In the remainder of this paper, we outline the general method for the five experiments we performed. We then describe the specific methods and results for each experiment. Finally, we highlight theoretical and design implications for both the individual studies and for the experimental paradigm as a whole.

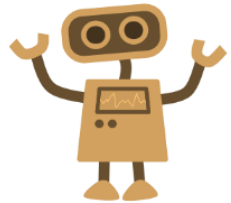


Clifford Nass



Youngme Moon

Nass et al. 1994; Nass & Moon 2000



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

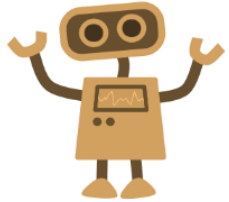
result in

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

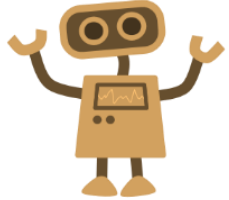
Social Responses

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

People have names
→ chatbot appears
like a real person

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

Example #2



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

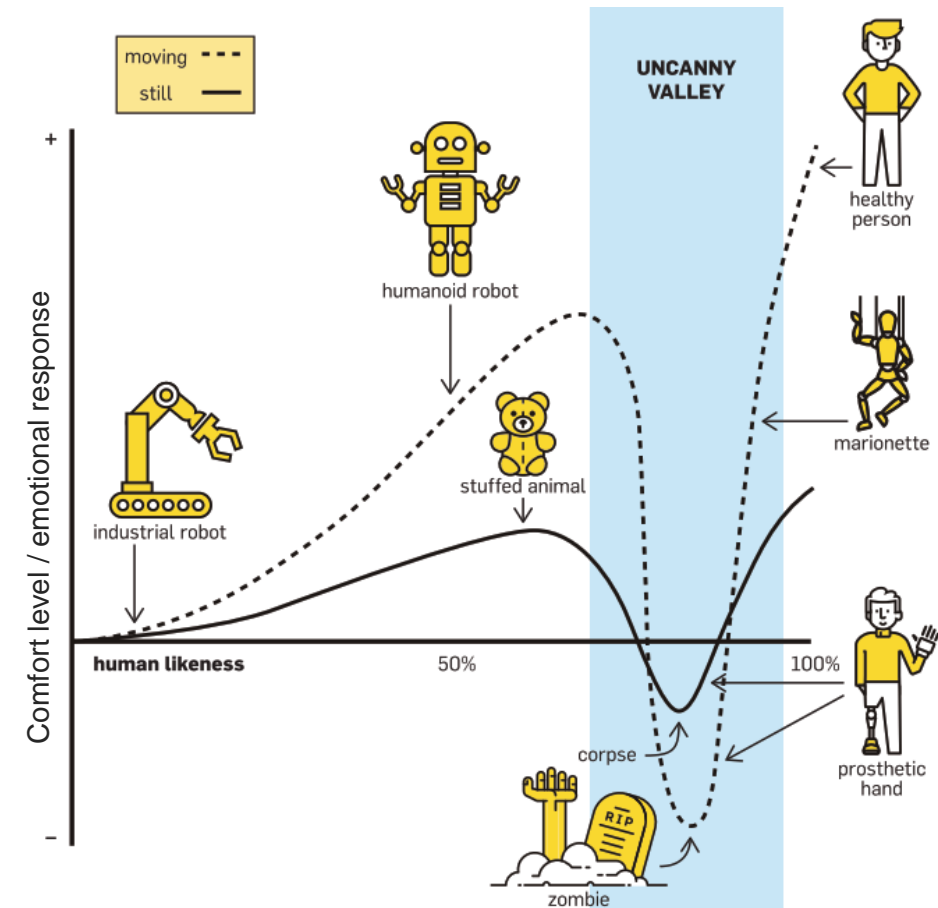
*“I have noticed that, in climbing toward the goal of making robots appear human, our affinity for them increases until we come to a valley, which I call the **uncanny valley**.”*



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

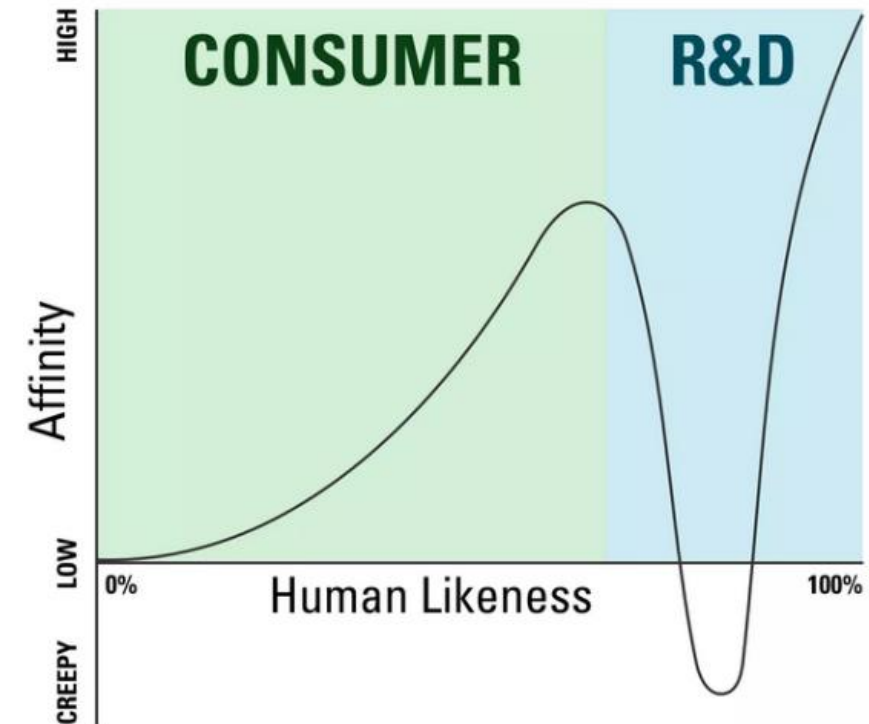
Mori 1970

- 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 to language (e.g., computer generated voices)
- Business should stay out of the uncanny valley
- Researchers can explore and push the boundaries of human likeness



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

How human should a non-human robot be?

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

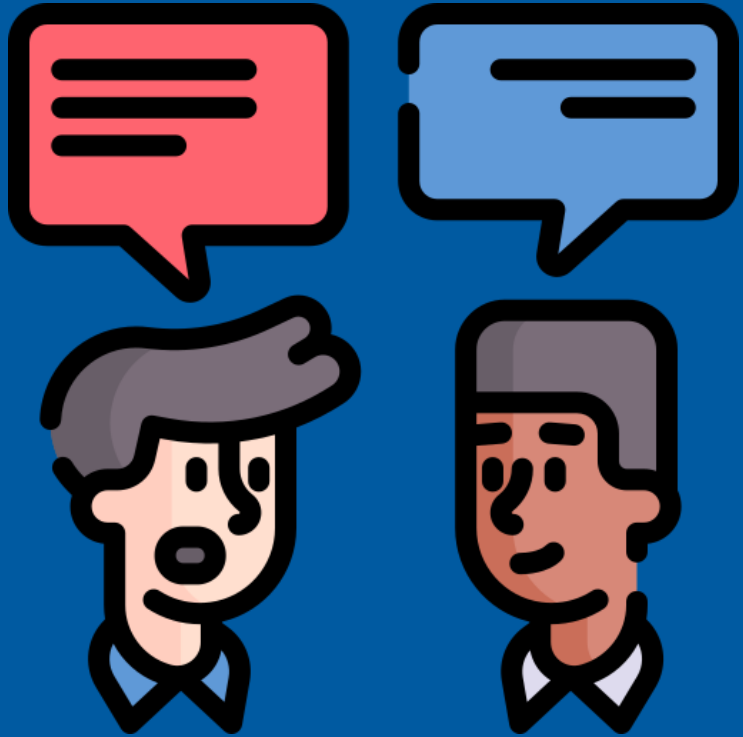
What happens when we cross the uncanny valley?

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

*“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.”*



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?

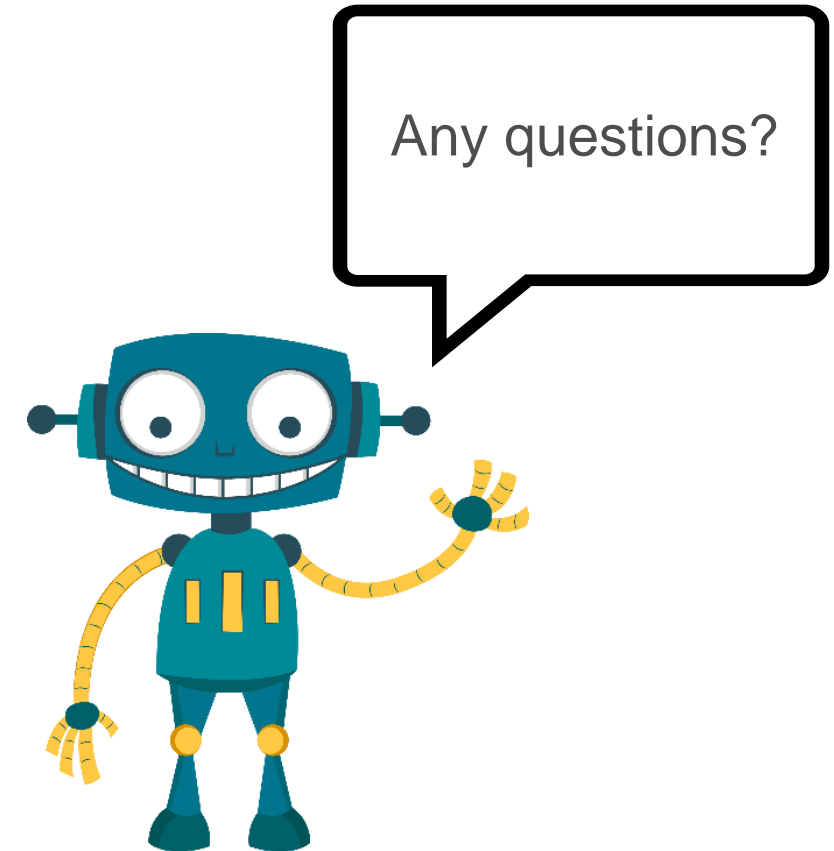
→ Discuss these questions with a partner for ~**5 minutes** and be ready to share your opinions

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



***Thank you for
your attention!***



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