

# Naturalistic Design - Alexa

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# Speaking with Machines

# Natural Conversation



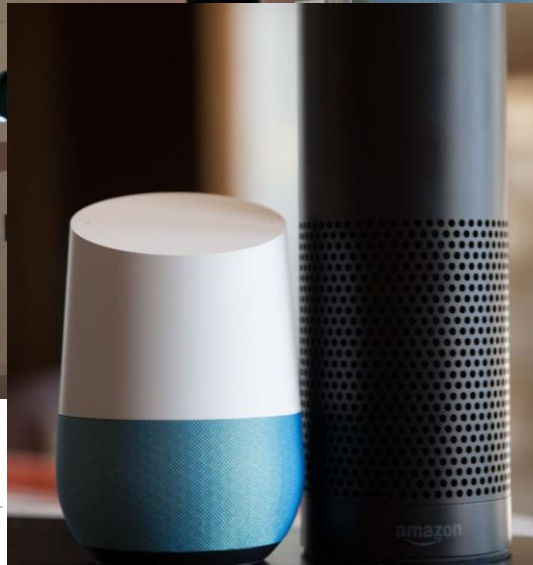
What is unique about conversation?

# Social Connection Verbal Pointing Combinatorial

# Companion, Tool, or Both



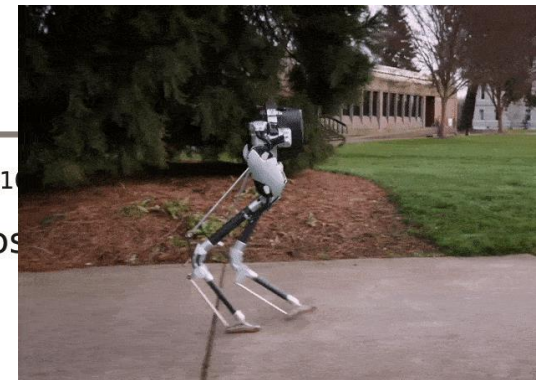
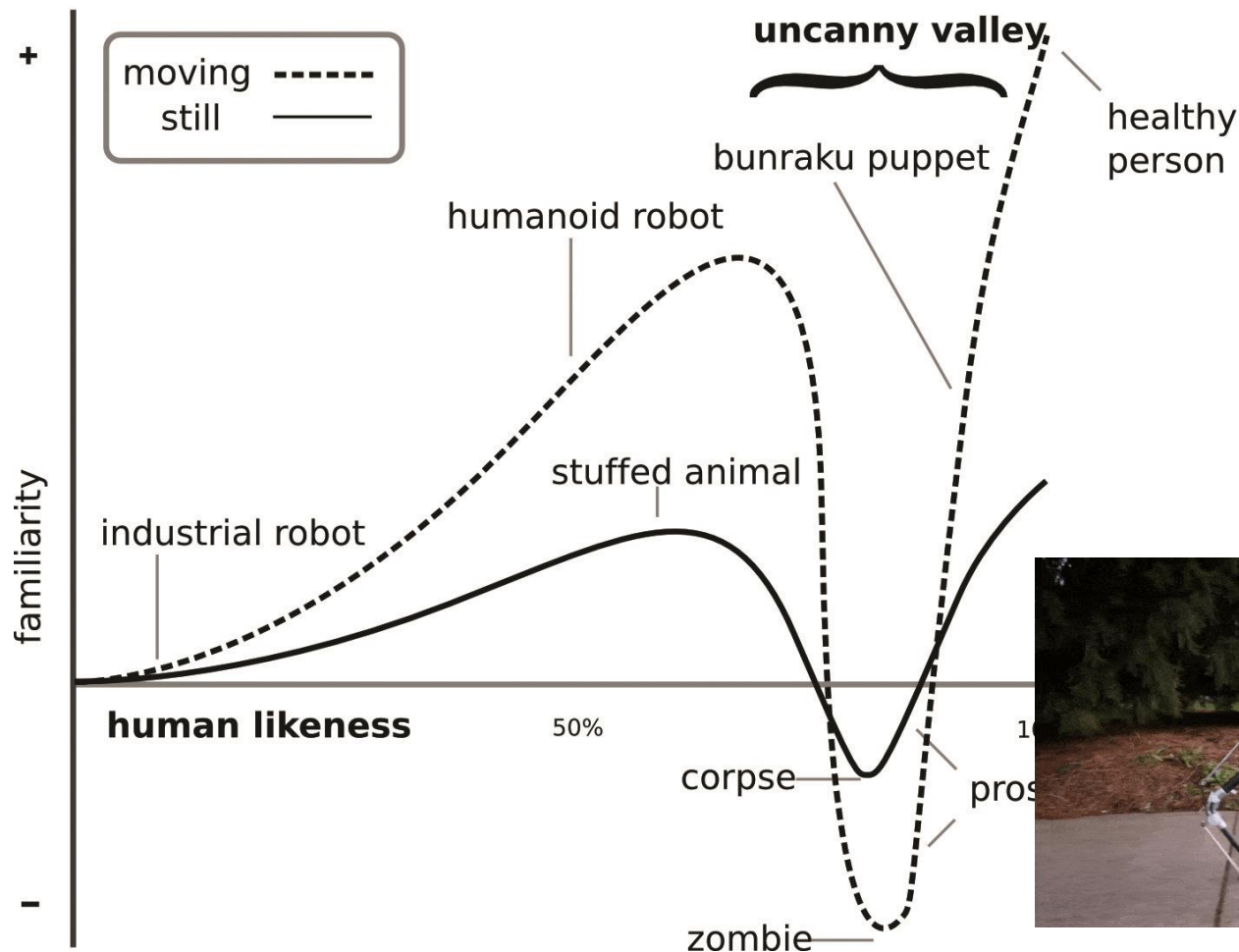
Luton



Armstrong  
Queensland



# Emotional and Social Relationship





# Artificial Intelligence and Voice



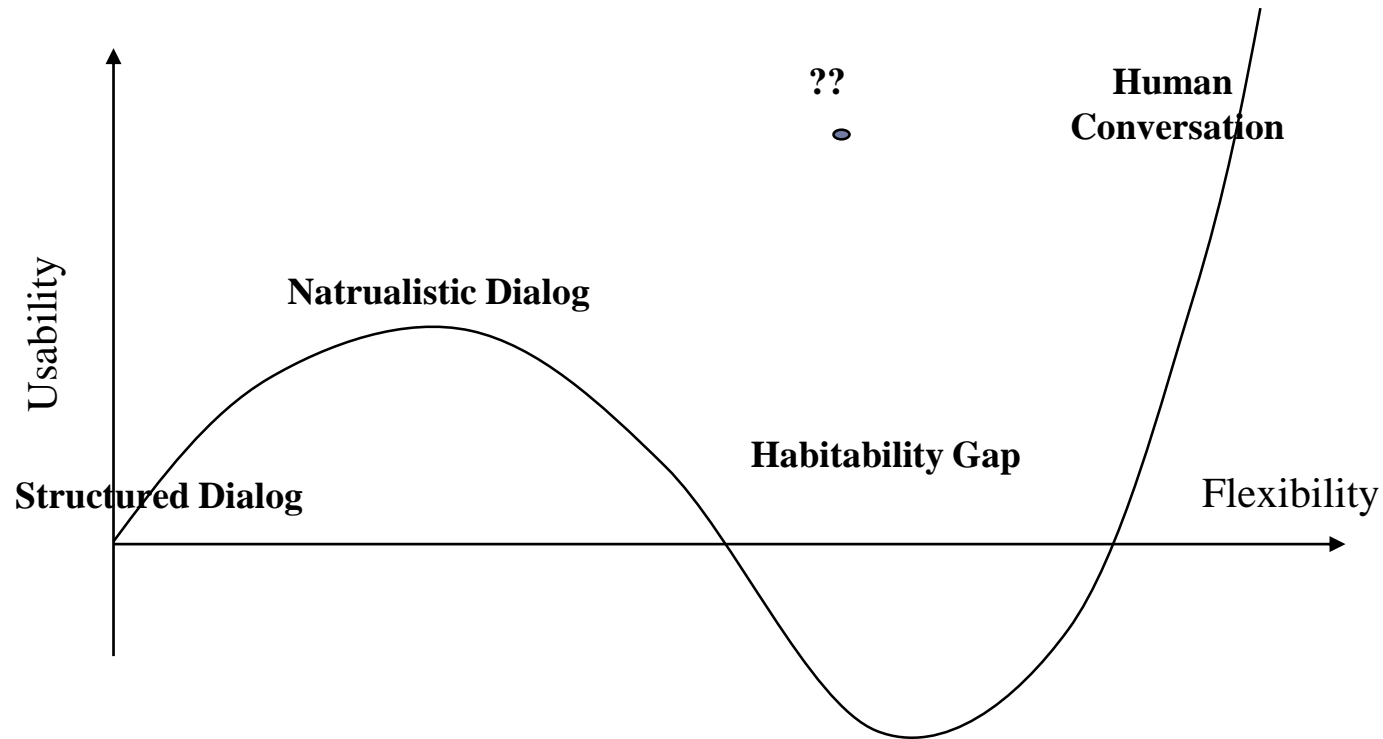
Sogou 搜狗

AI ANCHOR

English AI Anchor

This is my very first day in Xinhua News Agency

# Emotional and Social Relationship





# Faking It

# How are people able to hold conversations?

Speech Recognition

Speech Generation

Language Understanding

Language Generation

Timing and Turn-Taking

Attention and Memory

Theory of Mind

Grounding and Error Correction

Dialog Task

World Knowledge

Emotion and Social Relationships

# Which of these are mature technology?

Speech Recognition

Speech Generation

Language Understanding

Language Generation

Timing and Turn-Taking

Attention and Memory

Theory of Mind

Grounding and Error Correction

Dialog Task

World Knowledge

Emotion and Social Relationships

You're only as good  
as your weakest link

# Speaking with Machines

“since a spoken language system consists of a number of different components, each of which possesses a certain level of technical capability, then in order to be coherent (and hence usable), the design of the overall system needs to be aligned to the component with the lowest level of performance.”

Moore, R. K. (2016).

- Is spoken language all-or-nothing? Implications for future speech-based human-machine interaction. In K. Jokinen & G. Wilcock (Eds.), Dialogues with Social Robots – Enablements, Analyses, and Evaluation. Springer Lecture Notes in Electrical Engineering (LNEE). <http://arxiv.org/abs/1607.05174>



# Bad Design with Brilliant Technology



# Theory of Mind

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- ❑ The user builds a model of the machine's mind
  - ❑ What can it do?
  - ❑ What is it able to understand?
  - ❑ What does it remember from previous interactions
  - ❑ What does it think that I know?
- ❑ The machine builds a model of the users mind
  - ❑ What do they want?
  - ❑ What have they done previously?
  - ❑ What do they prefer?

Users adapt their behaviour to match  
the machine's apparent abilities

It's all about Design

# Discoverability

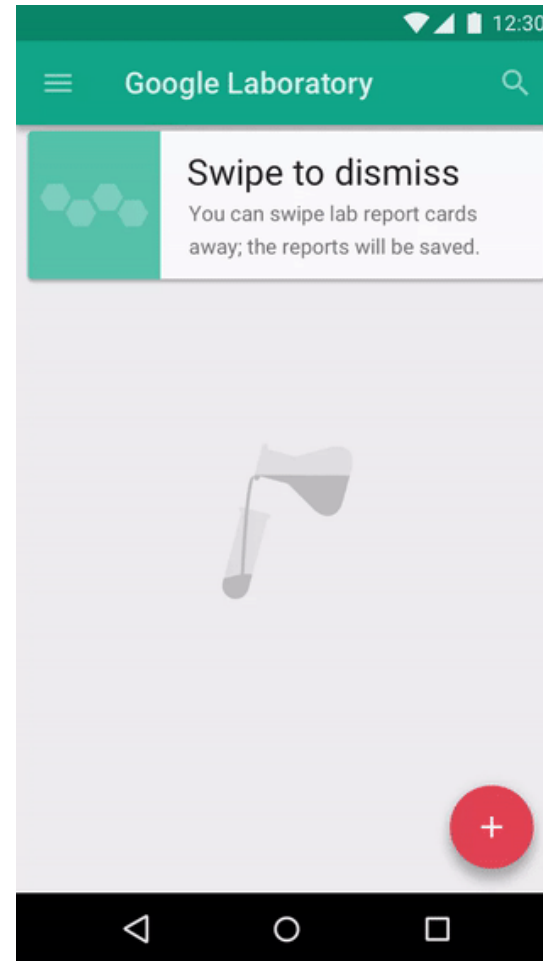
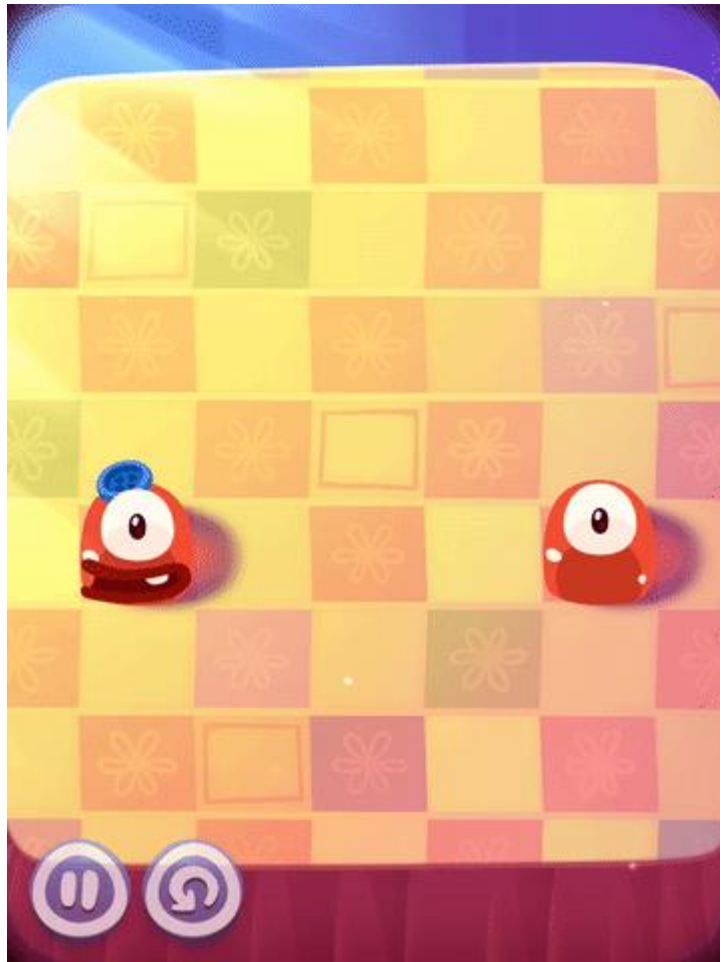


Yesterday's News



# Discoverability in a Visual User Interface

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Actively support the user to discover what the machine can do

# Grounding

“the process of agreeing a fact in a conversation”

Agreed: he has the book



Agreed: he has the house keys



Agreed: They'll meet at the station

Not agreed: The time

Agreed: At five o'clock

Double Agreed: At five o'clock



“I have the book.”

“uh huh”

“And the house keys.”

<silent>

“So, I’ll see you at the station at six o’clock”

“No, Five o’clock!”

“Five o’clock”

“Yes”

Grounded  
conversations are  
more stable to error

# Turn-Taking



Longer pauses lead to  
faster conversations



# Drawing it Together



It's better to be a  
good machine than a  
bad person

# Contact Us

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<https://www.eiginc.com/>