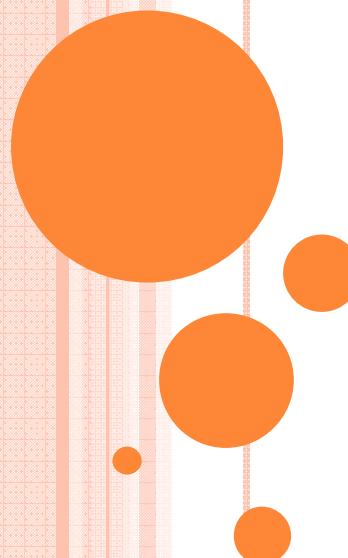


The android  
“Geminoid HI-1”



感情

笑い

# EMOTIONS & LAUGHTER FOR ROBOTS AND ANDROIDS

(ロボットとアンドロイドのための感情と笑い)

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Alexander von Humboldt  
Stiftung/Foundation

# OVERVIEW

- I. Where I am from.  
(私の出身地)
- II. Robots and emotions?  
(ロボットと感情?)
- III. WASABI: Hot and Emotional!  
(わさび: 辛いと感情的な!)
- IV. Laughing robots? What do you think?  
(笑うロボット? あなたはどう思う?)
- V. Geminoid HI-1: A professor's copy!  
(ジェミノイドHI-1:ある教授のコピー!)
- VI. Why I hope to see you again.  
(なぜ私が皆さんにまた会いたいのか)

# I. WHERE I AM FROM: GERMANY

## (私の出身地:ドイツ)



# I. WHERE I AM FROM: BIELEF

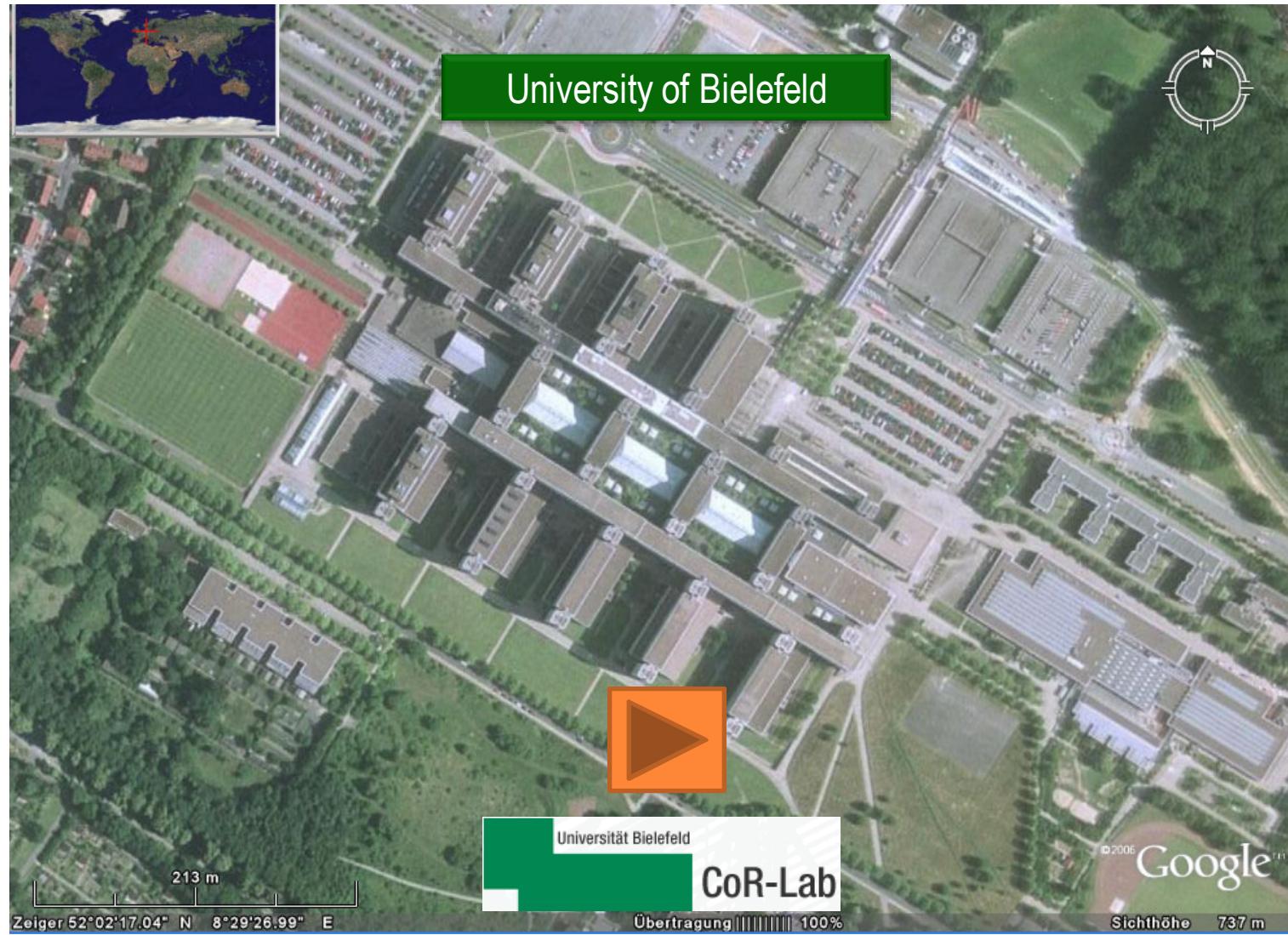
(私の出身地:ビーレーフルト)



# I. WHERE I AM FROM: (私の出身地)



# I. WHERE I STUDIED COMPUTER SCIENCE: (私がコンピューターサイエンスを学んだところ)



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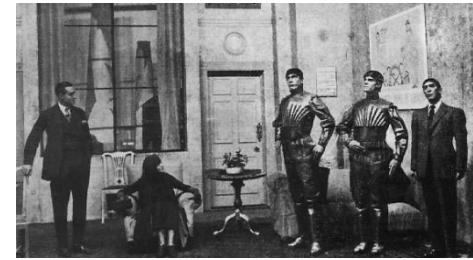
## II. ROBOTS AND EMOTIONS? (ロボットと感情?)

### ○ What is a “robot”? (ロボットとは?)

- Etymology (語源) 1921 :
  - Karel Čapek introduces the term “robot” in his play “R.U.R. (Rossum's Universal Robots)”
  - Čapek’s “robots” are built to serve humans
  - The old czech word “roboťa” means “hard work”.  
(昔のチェコ語「ロボタ」は、大変な仕事を意味する)
- Real-world robots:
  - 18<sup>th</sup> century: “からくり” mechanical puppets (Japan)
  - late 18<sup>th</sup> century: “Automaton Chess Player” invented by Wolfgang von Kempelen (Hungary)
  - 1961: “Unimate” first industrial robot, Unimation company (America)
  - 2000: “ASIMO” humanoid robot, Honda Motor Company (Japan)
  - ...



“ASIMO” (2000)



Scene of the play “R.U.R.”



Automaton chess player  
(rebuilt in 2004,  
original 18<sup>th</sup> century)



Tea-serving karakuri  
(18<sup>th</sup> century)



“Unimate” (1961)

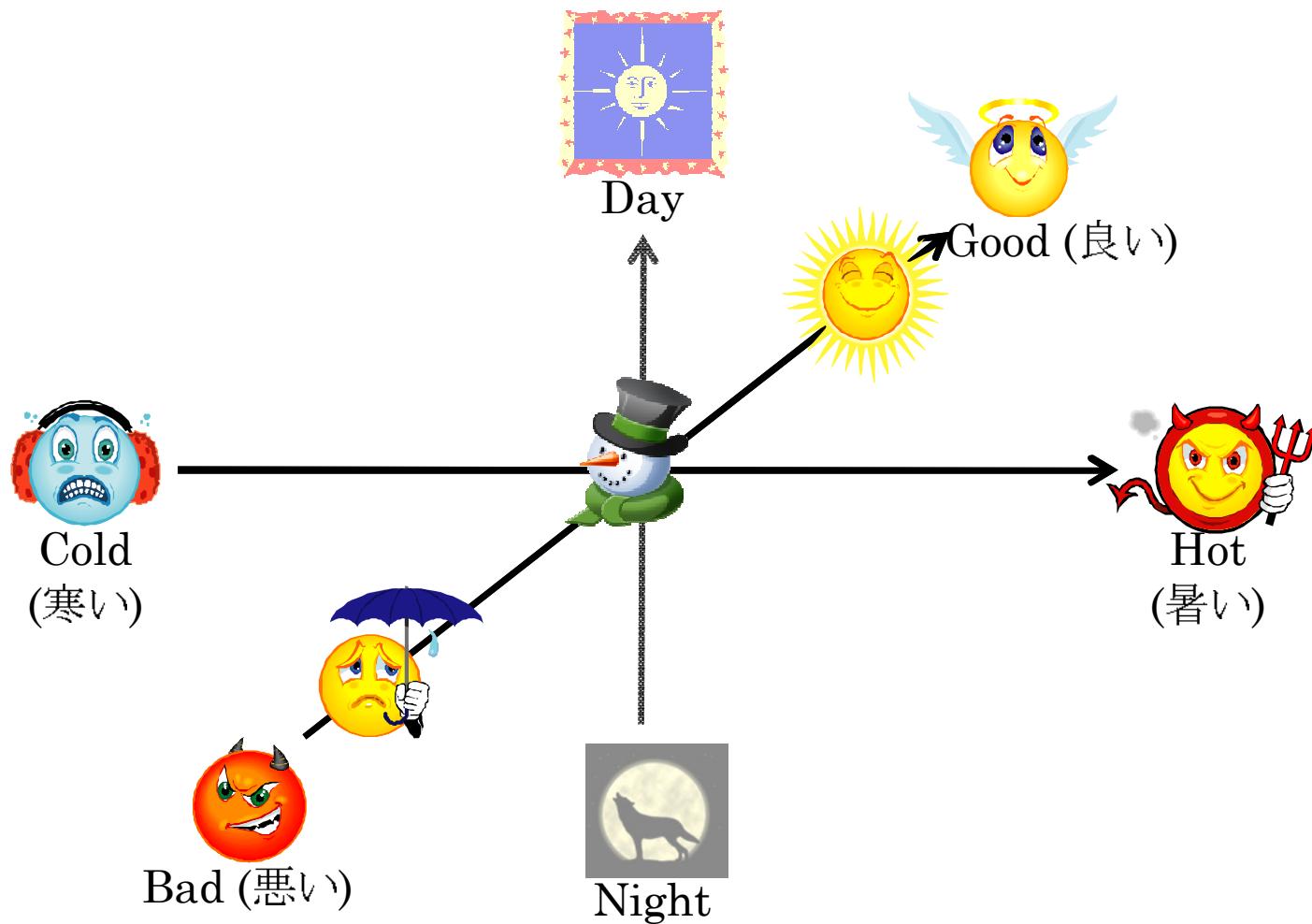
## II. ROBOTS AND EMOTIONS? (ロボットと感情?)

### ○ What is an “emotion”? (感情とは?)

- No clear definition exists (はっきりとした定義はない)
  - Psychologists, Biologists, Cognitive Scientists, Philosophers, Computer Scientists, ... all of them discuss a lot!
- The concept “Emotion” is similar to “Weather” (天気):
  - Good  or bad  weather  
→ positive or negative emotions
  - Rain , sunshine , snow , hot , cold , ...  
→ happy , sad , angry , fearful , bored  ...
  - BUT:  
Is an earthquake  a kind of “weather”?  
→ Is “being hungry”  an emotion?
- Important: Cold  weather can be good  weather & hot  weather can be bad  weather!

## II. ROBOTS AND EMOTIONS (ロボットと感情?)

- The three dimensional WEATHER space:



## II. ROBOTS AND EMOTIONS (ロボットと感情?)

Not my own idea!

(Wundt 1863)

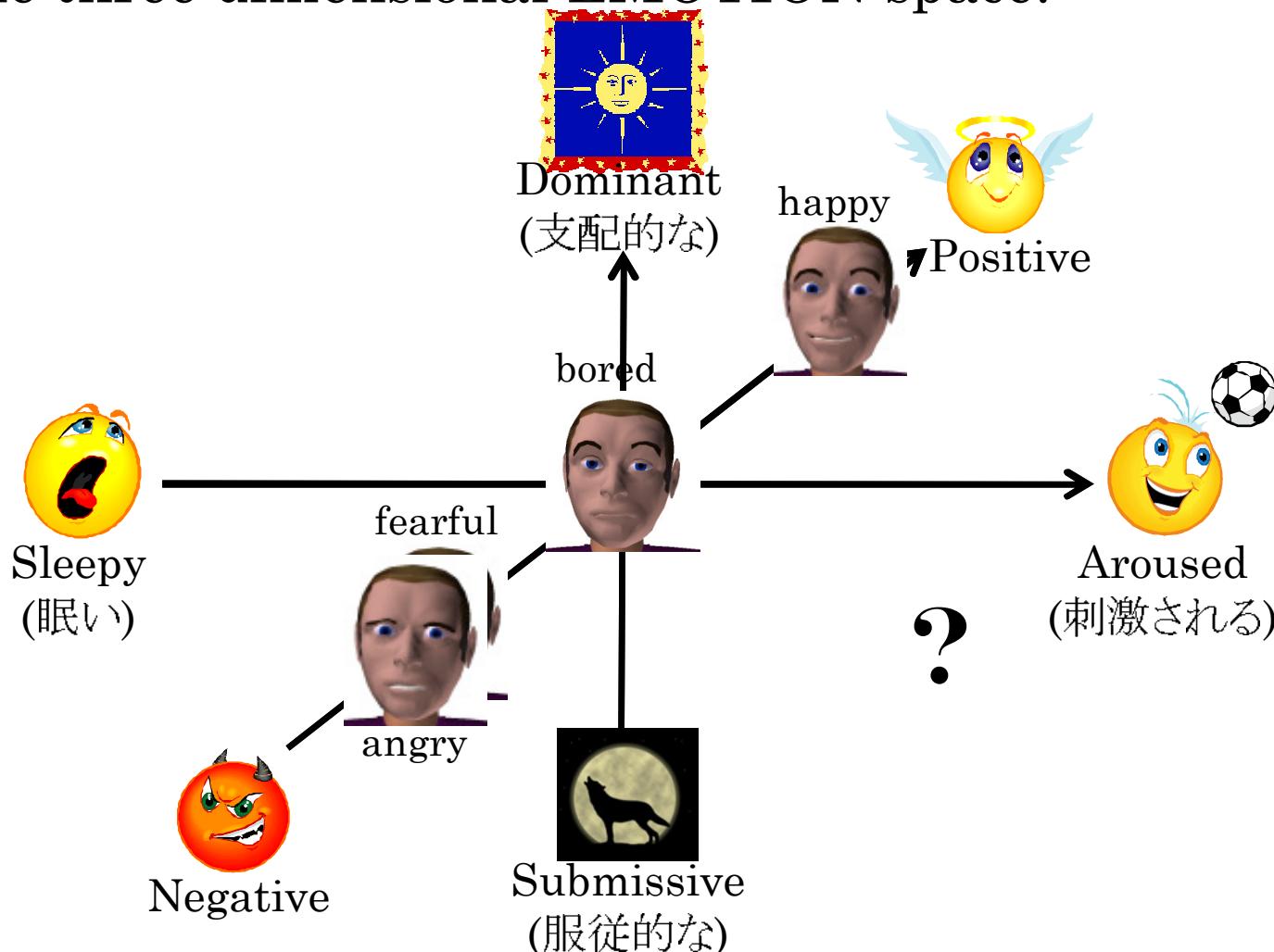
(Russel & Mehrabian 1977)

(Gehm & Scherer 1988)

(Russel & Feldmann Barrett 1999)

...

- The three dimensional EMOTION space:



# OVERVIEW

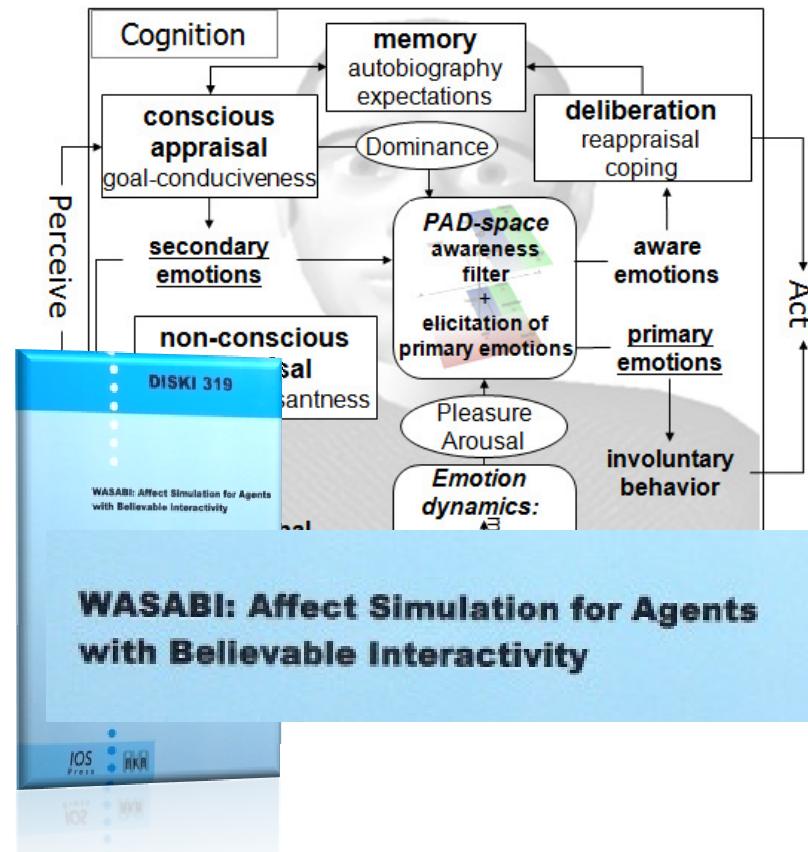
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### III. WASABI: HOT AND EMOTIONAL (わさび: 辛いと感情的な)

Japanese root  
(日本の根)



Emotion system  
(感情のシステム)



### III. WASABI: HOT AND EMOTIONAL (わさび: 辛いと感情的な)

- The virtual human MAX plays Skip-Bo against a human (in Bielefeld, Germany)  
(バーチャルヒューマン「マックス」は人間と「Skip-Bo」というゲームをする)



- Why robots (might) need emotions?  
(なぜ、ロボットは感情が必要か?)

How NOT to tell jokes!



→ To be more than servants to humans!  
(人間の召使以上になるため)

# OVERVIEW

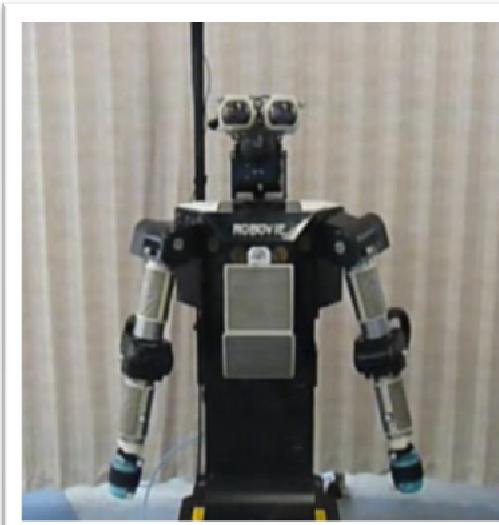
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## IV. LAUGHING ROBOTS? (笑うロボット?)

- A short experiment:
  - Six types of laughter  
(笑い声の6タイプ)
  - Two humanoid robots:  
(2台のヒューマノイドロボット)
    - Robovie II
    - Robovie R2

- Question:

How well does each laughter fit to each robot?  
(それぞれの笑い声はそれぞれのロボットにどのくらい合っているか?)



Robovie II



Robovie R2

## IV. LAUGHING ROBOTS? (笑うロボット?)

- A short experiment:

Laughter 1



- How well does this laughter fit to each robot?  
(この笑い声はそれぞれのロボットにどのくらい合っているか?)

## IV. LAUGHING ROBOTS? (笑うロボット?)

- A short experiment:

Laughter 2



- How well does this laughter fit to each robot?  
(この笑い声はそれぞれのロボットにどのくらい合っているか?)

## IV. LAUGHING ROBOTS? (笑うロボット?)

- A short experiment:

Laughter 3



- How well does this laughter fit to each robot?  
(この笑い声はそれぞれのロボットにどのくらい合っているか?)

## IV. LAUGHING ROBOTS? (笑うロボット?)

- A short experiment:

Laughter 4

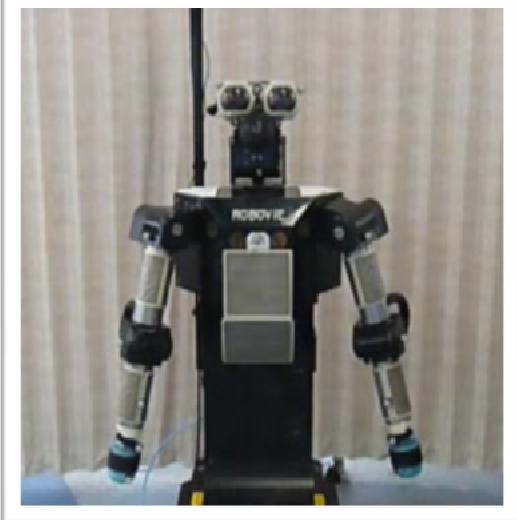


- How well does this laughter fit to each robot?  
(この笑い声はそれぞれのロボットにどのくらい合っているか?)

## IV. LAUGHING ROBOTS? (笑うロボット?)

- A short experiment:

Laughter 5



- How well does this laughter fit to each robot?  
(この笑い声はそれぞれのロボットにどのくらい合っているか?)

## IV. LAUGHING ROBOTS? (笑うロボット?)

- A short experiment:

### Laughter 6



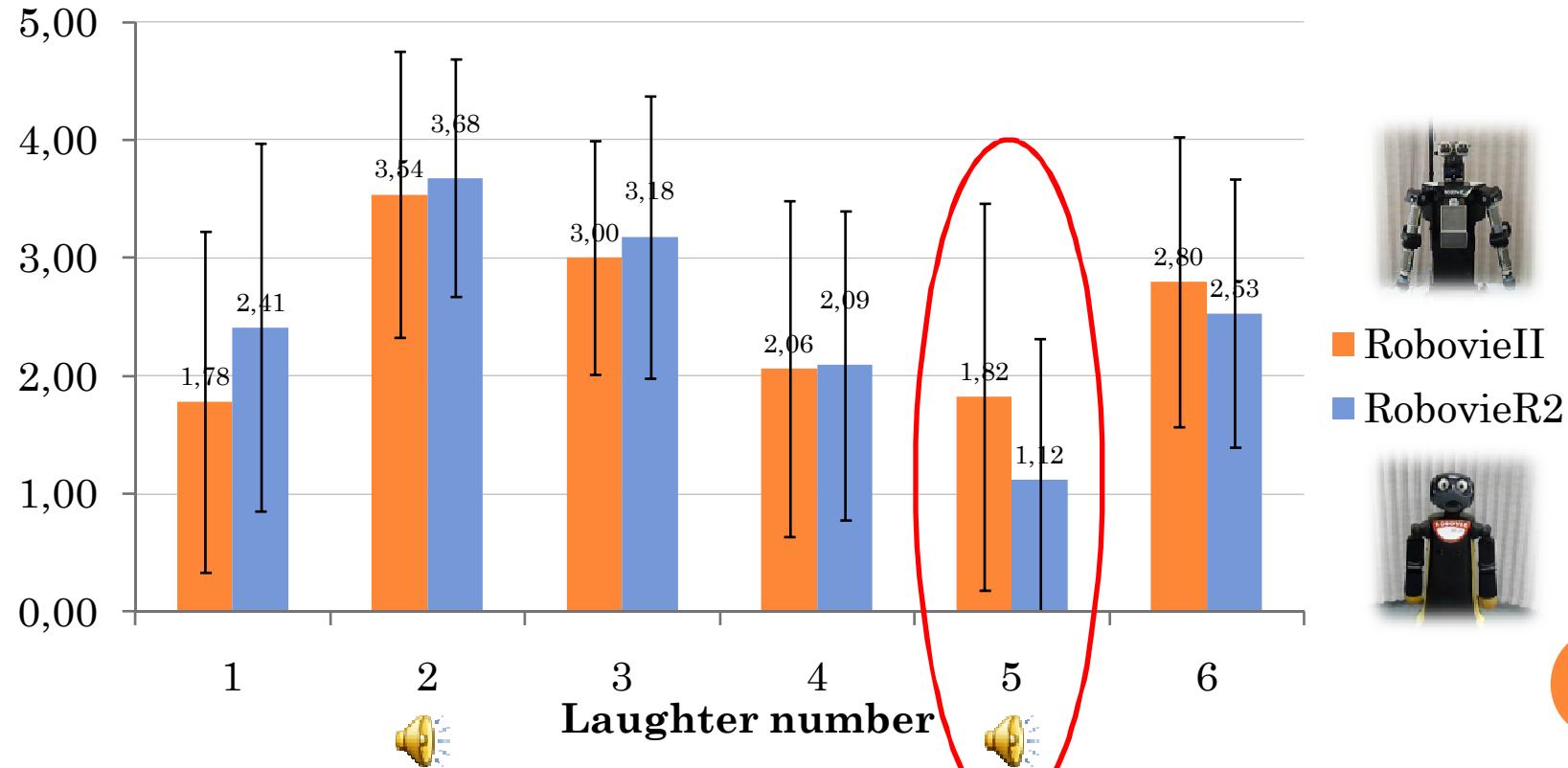
どうもありがとうございました

m(\_ \_)m

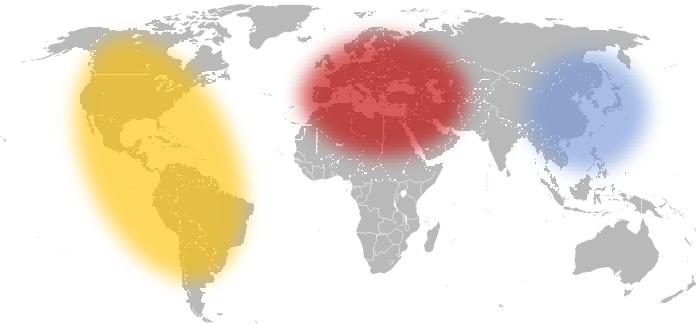
- How well does this laughter fit to each robot?  
(この笑い声はそれぞれのロボットにどのくらい合っているか?)

## IV. LAUGHING ROBOTS? (笑うロボット?)

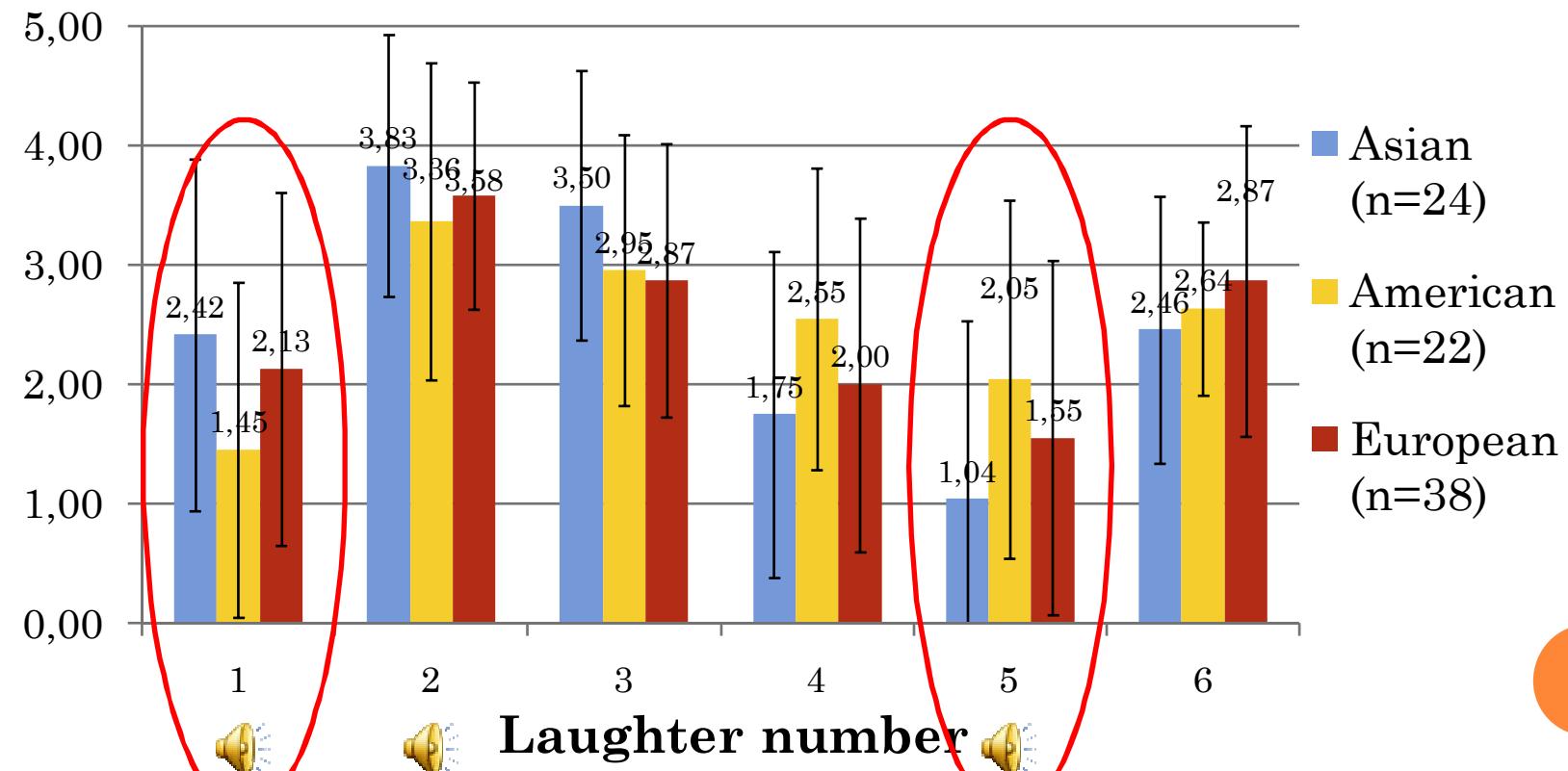
- Results of an online survey, II vs. R2:



## IV. LAUGHING ROBOTS? (笑うロボット?)



- Results of an online survey, internationally:



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## V. GEMINOID HI-1: AN ANDROID AT ATR (ジェミノイドHI-1:ATRにいるアンドロイド)

- What is an “android”?

(アンドロイドとは?)

- “アンドリュー” (Andrew)

is an

“アンドロイド” (Android), which wants to be a human.

(アンドリューは人間になりたいアンドロイド)

- “ジェミノイド” (Geminoid)

is a real

“アンドロイド” (Android) at ATR in Kyoto, which is a copy of Prof. Ishiguro.

(ジェミノイドは石黒教授のコピーで、京都のATRにいる本物のアンドロイド)



## V. GEMINOID HI-1 & LAUGHTER (ジェミノイドHI-1と笑い)



- Can Geminoid produce natural laughter?  
(ジェミノイドは自然に笑うことができるか?)
- How do people react, when Geminoid laughs?  
(ジェミノイドが笑うと、人間はどう反応するか?)

Ongoing research:  
(進行中の研究)

- Geminoid as non-neutral experimenter!  
(中立でない実験者としてのジェミノイド!)



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(なぜ私が皆さんにまた会いたいのか)

## VI. WHY I HOPE TO SEE YOU AGAIN (なぜ私が皆さんにまた会いたいのか)

Please answer the following questions to yourself:  
(次の質問に答えてください)

1. Do you often ask yourself: "Why?"  
(あなたはよく自分自身に「なぜ?」と問いかけますか?)
2. Do you like thinking – every moment in life?  
(あなたは考えることが好きですか?)
3. Would you like to explore the world and boldly go where nobody has gone before?  
(あなたは世界を探検したいですか?)



If YES:

Study English, become a researcher, and let us meet again somewhere!

Science is FUN!

THANK YOU AND GOOD LUCK!



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