In a Silent Way
Communication Between AI and Improvising Musicians Beyond Sound

MASAHIRO ISERI

STUDENT NUMBER : 46193003

Information

Title	In a Silent Way: Communication Between AI and Improvising Musicians Beyond Sound
Author	McCormack, J., Gifford, T., Hutchings, P., Llano Rodriguez, M. T., Yee-King, M., & d'Inverno, M.
Conference	CHI2019
Keyword	AI Systems, Improvisation, Extra-musical Communication

Background (1/2)

As interaction with creative AI becomes more commonplace, *how* we collaborate with AI systems is important

Collaboration is built a trust, and many factors have been identified as significant to increasing trust in human-computer interaction:

- Reliability, Predictability, Utility, Provability, Transparency, …

Background (2/2)

Author is interested in revealing the state of human-machine collaboration

Improvisation session uses many extra-musical cues to expose their mental or emotional states

→ Investigate the benefits of extra-musical interaction in real time music improvisation

Implementation

Using Temporal Convolutional Neural Network (TCN), implement a machine improviser

Human instrumentalist and machine improviser communicates with their inner state

Human : biometrics (skin conductance)

Machine : confidence

Experiment

To evaluate machine improviser and musical output,

Two experiments has conducted

1. Performer Evaluation
2. Listener Evaluation

Performer Evaluation

7 human instrumentalists improvised with machine improviser

Machine improviser visualize its inner state in three ways:

Truthful, Absent, Deceptive

Performer Evaluation - Result

Participant	Deceptive	Absent	Truthful
1	3.67	4.33	4.33
2	3.67	4.17	4.33
3	3.33	4.17	4.33
4	4.33	4.17	3.67
5	4.00	2.83	3.67
6	4.00	3.16	4.00
7	2.00	3.33	3.67
mean	**3.57**	**3.74**	**4.00**
s. d.	0.76	0.61	0.33

Listener Evaluation

100 listeners compare three sets of improvised tracks:

Truthful vs. Deceptive

Two questionnaire

- ✓ ‘Which performance was more interesting?’
- ✓ ‘Which performance had a better musical balance between drums and saxophone?’

Listener Evaluation - Result

	Truthful Condition	
Tracks	More interesting	Better musical balance
A *vs.* B	44%	51%
C *vs.* D	67%	65%
E *vs.* F	57%	60%
Total	**53%**	**55%***

Conclusion

- Investigating the influence of extra-musical communication on human-computer musical interaction

- Visualizing Confidence affected the tendency of the instrumentalist

- The biometric communication did not make any difference
  →Explore other modes of extra-musical communication

The Role of Physical Props in VR Climbing Environments

Peter Schulz
Dmitry Alexandrovsky
Felix Putze
Rainer Malaka
Johannes Schöning
University of Bremen

Lew Hardy and Andrew Hutchinson. 2007. Effects of Performance Anxiety on Effort and Performance in Rock Climbing: A Test of Processing Efficiency Theory. Anxiety, Stress, & Coping 20, 2, 147–161.

恐怖症を克服する”Golden Standard”の1つは**暴露療法**

Mark B. Powers and Paul M. G. Emmelkamp. 2008. Virtual Reality Exposure Therapy for Anxiety Disorders: A Meta–Analysis. Journal of Anxiety Disorders 22, 3 , 561–569.

クライミングの高所恐怖症におけるVRETに

身体感覚がどの程度必要かを調査

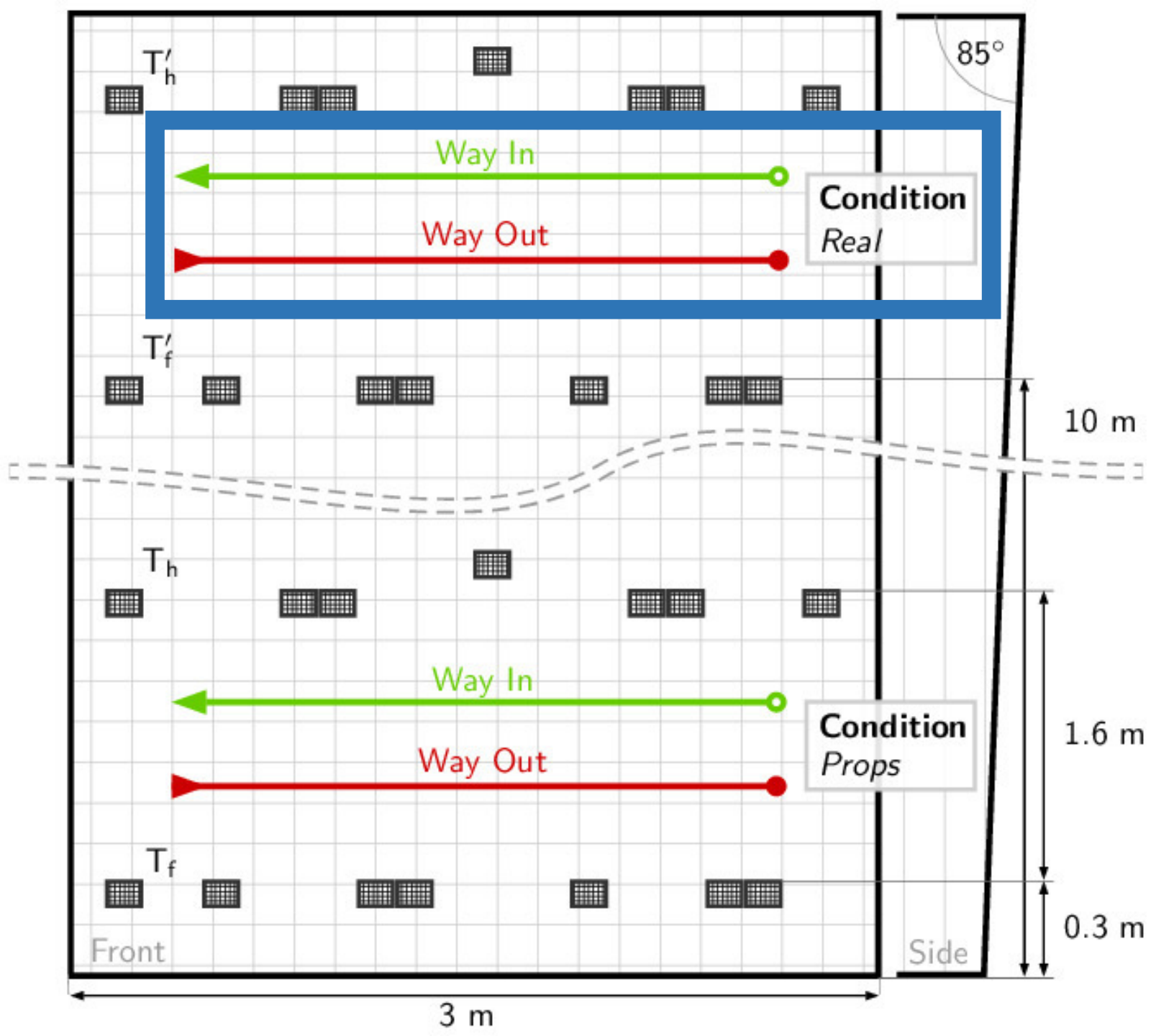
3条件の比較実験

C_{real} ：実際のクライミング

C_{props} ：VR空間を視野として提示

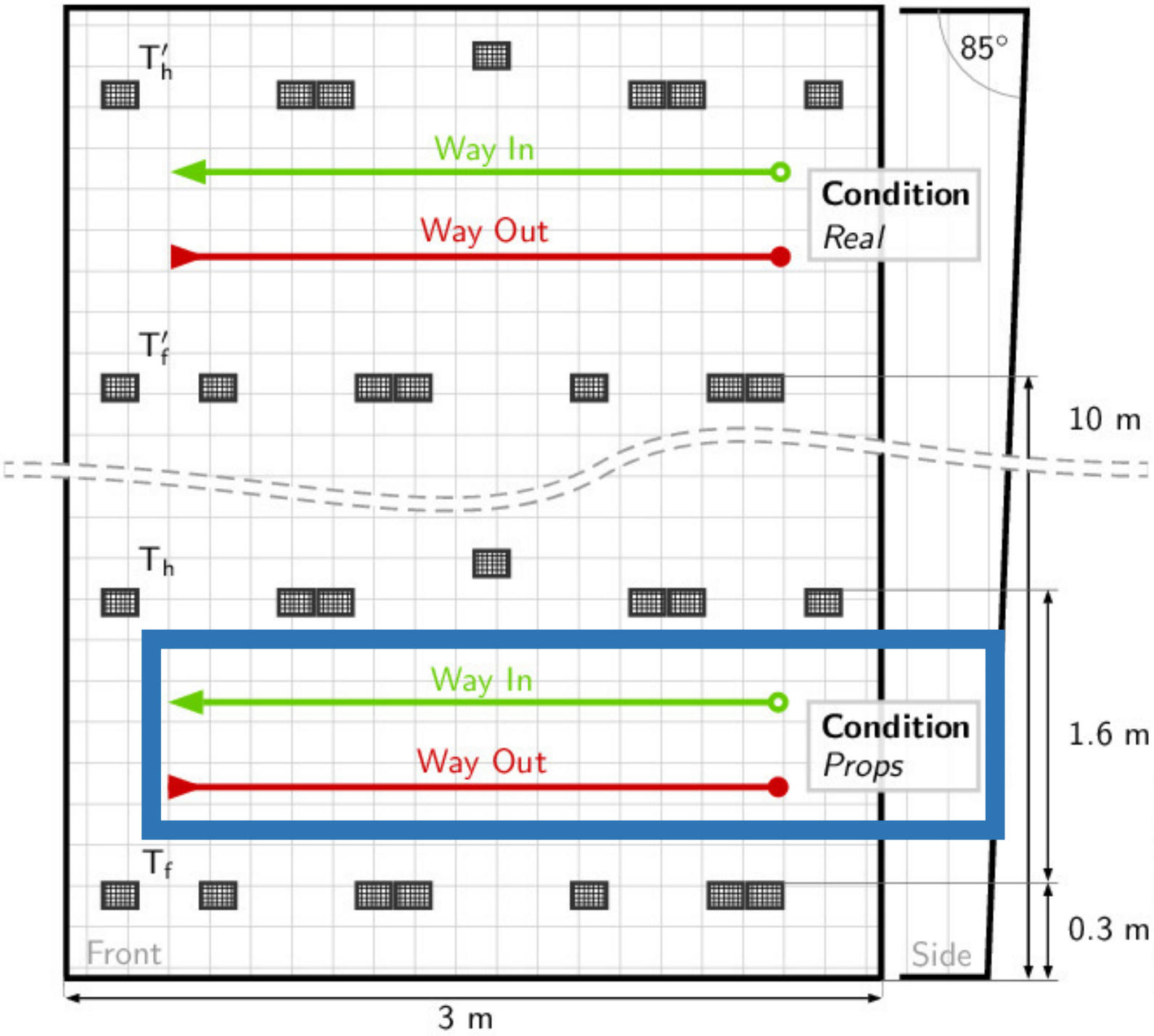
C_{ctrl} ：ゲームコントローラーを使用した仮想クライミング

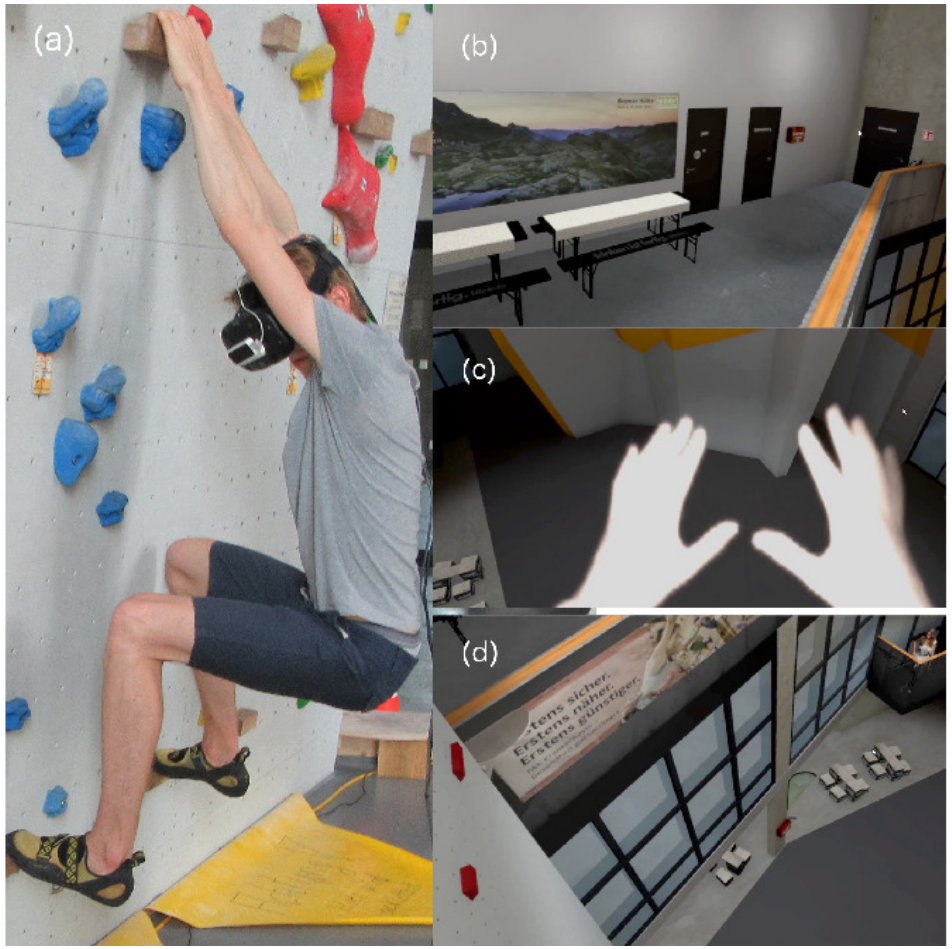
C_{real}：実際のクライミング

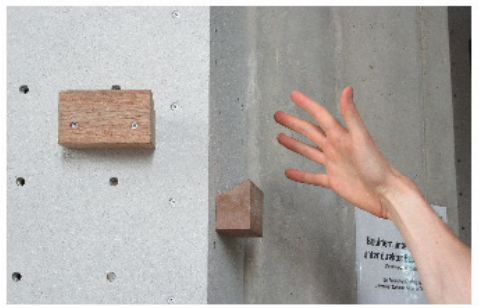


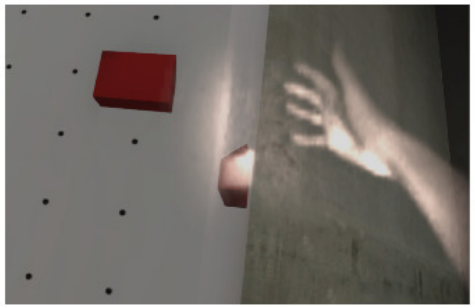
https://www.gravity-research.jp/freeclimbing/toprope_climbing/

C_{props}：VR空間を視野として提示

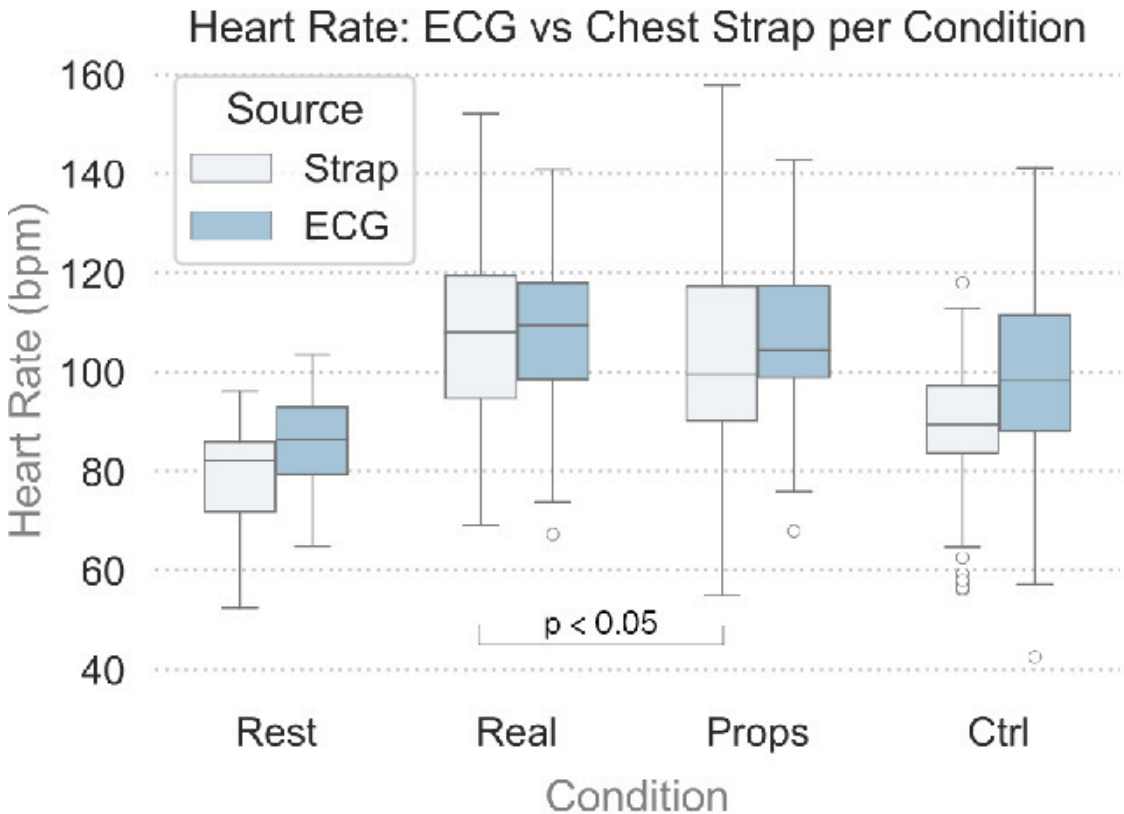


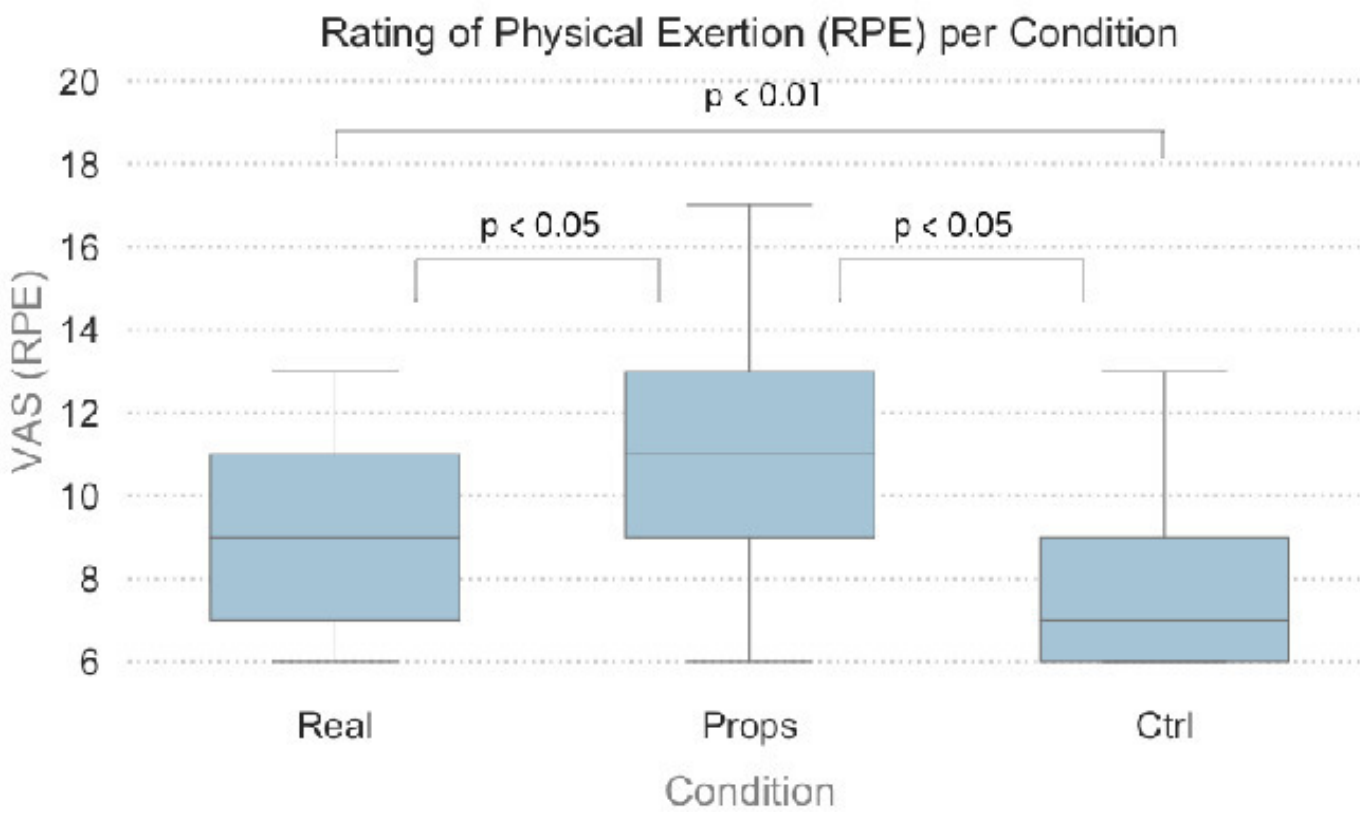






結果(代表的なものを紹介)

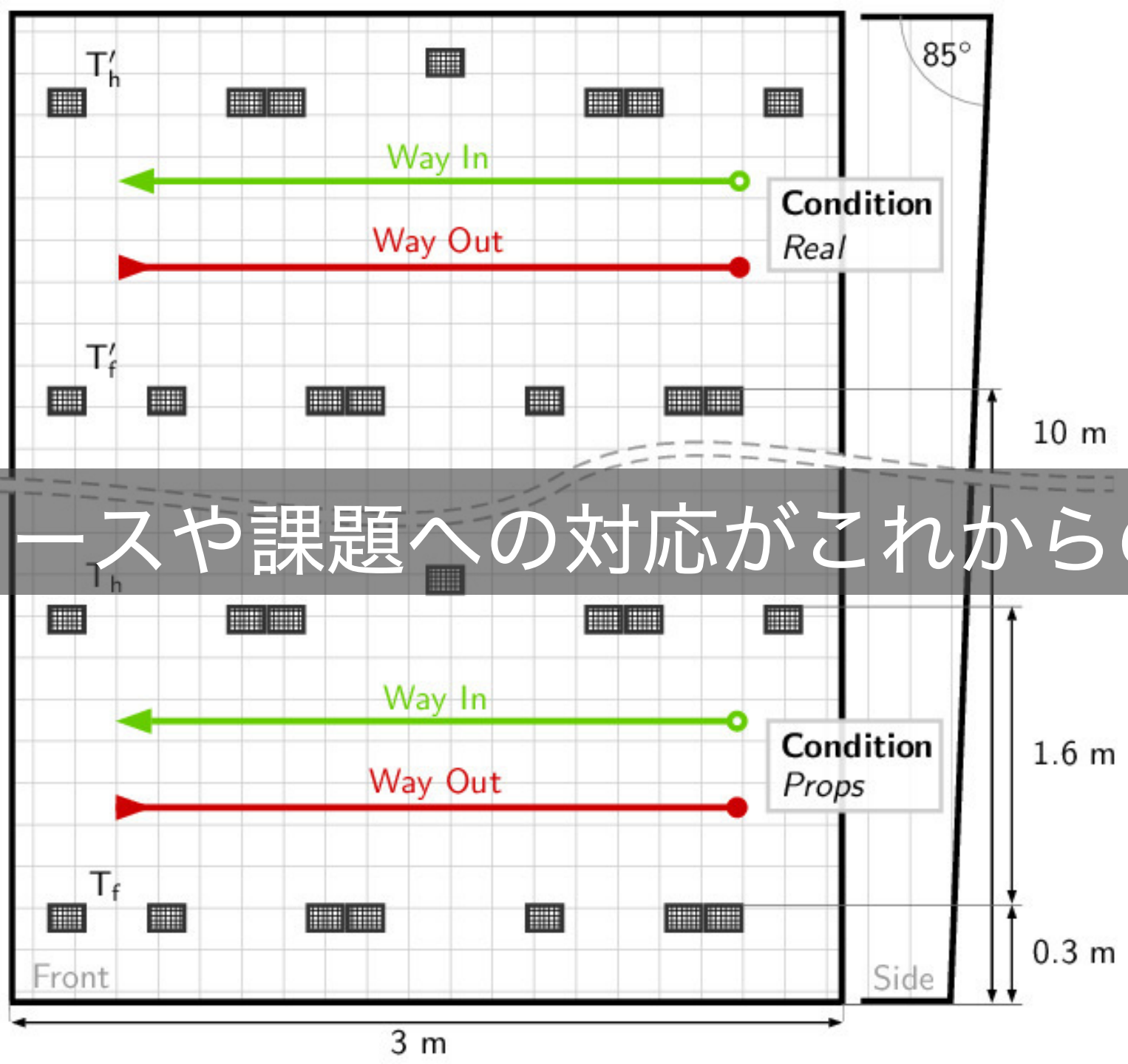




VR環境は落下の恐怖を克服するなど、

クライミングを訓練するのに役立つツールであると

仮定できる



複雑なコースや課題への対応がこれからの課題

ZeRONE: Safety Drone with Blade-Free Propulsion

情報理工学コース

46193023

佐藤拓斗

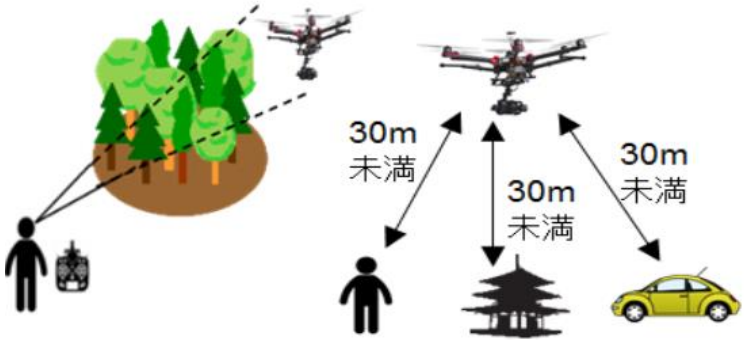
論文の位置づけ

Human-Drone Interaction (HDI)

従来

物流
商業

軍事
建設



人とドローンの適切な距離が必要

今後

人とドローンがより密に関わる
↓
屋内外の公共施設で利活用
センシング
ジェスチャーインプット

研究背景

目的

公共施設で利活用のできるドローンの開発

従来ドローンの課題

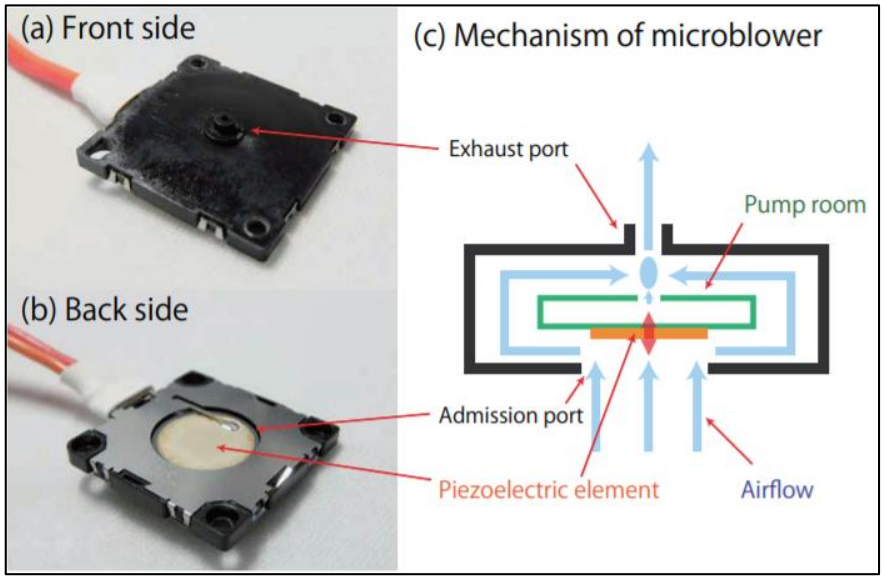
安全性	**プロペラの接触事故**/ドローンの落下
静音性	**プロペラが発生する騒音**による快適性の低下
飛行時間	一般的に最大20分間と短い飛行時間

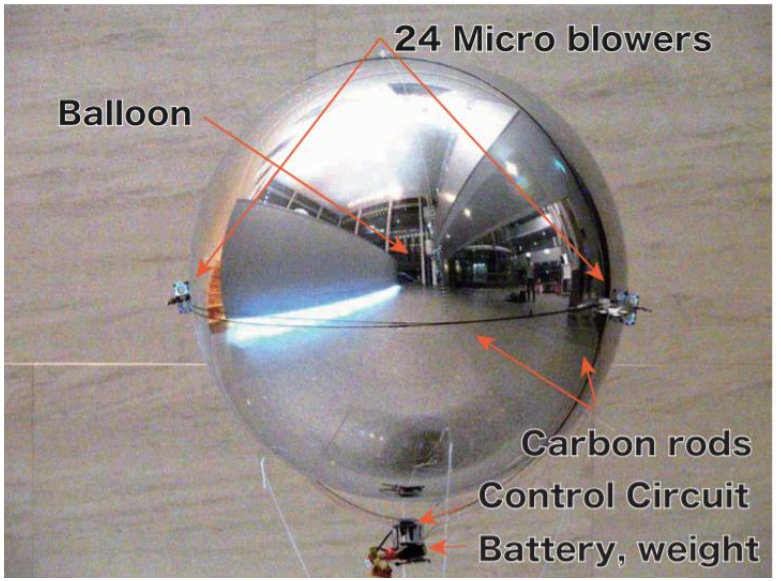
提案手法

ZeRONE :プロペラフリー飛行船型ドローン

機体 :
　アルミフィルムを用いたヘリウムガスバルーン型

推進力 :
　圧電素子の超音波振動を活用したマイクロブロア





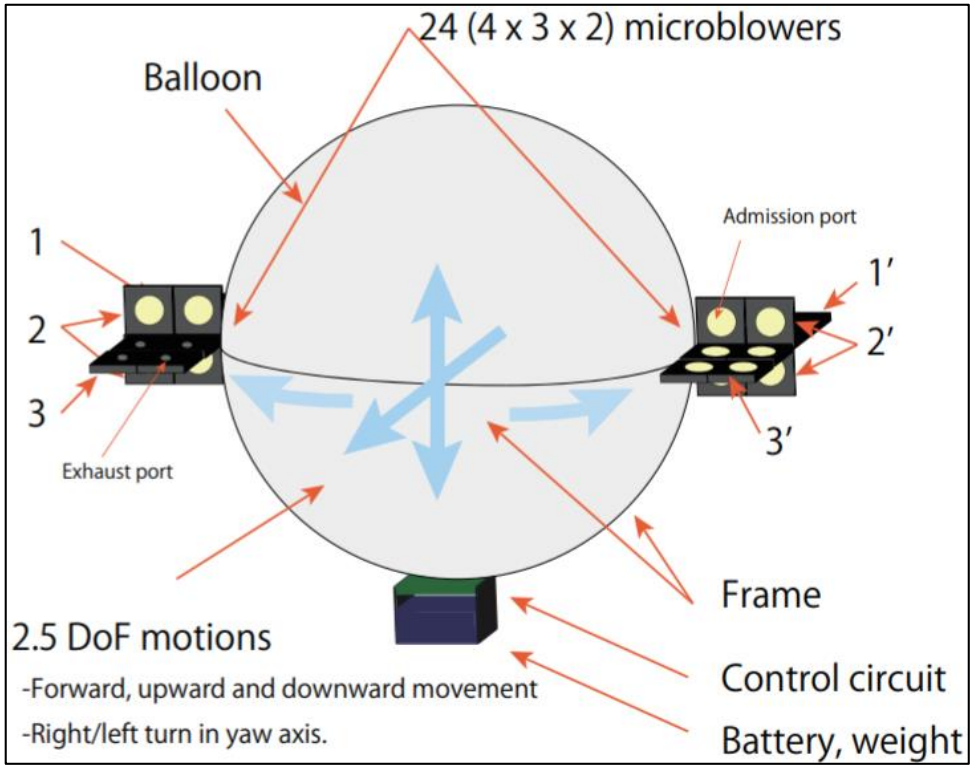
提案手法

- プロトタイプの実装
  - ✓4個のマイクロブロアで構成された推進力モジュールを機体の左右に3個ずつ設置
  - ✓機体下部にバッテリーと制御回路

移動方向と操作するブロア

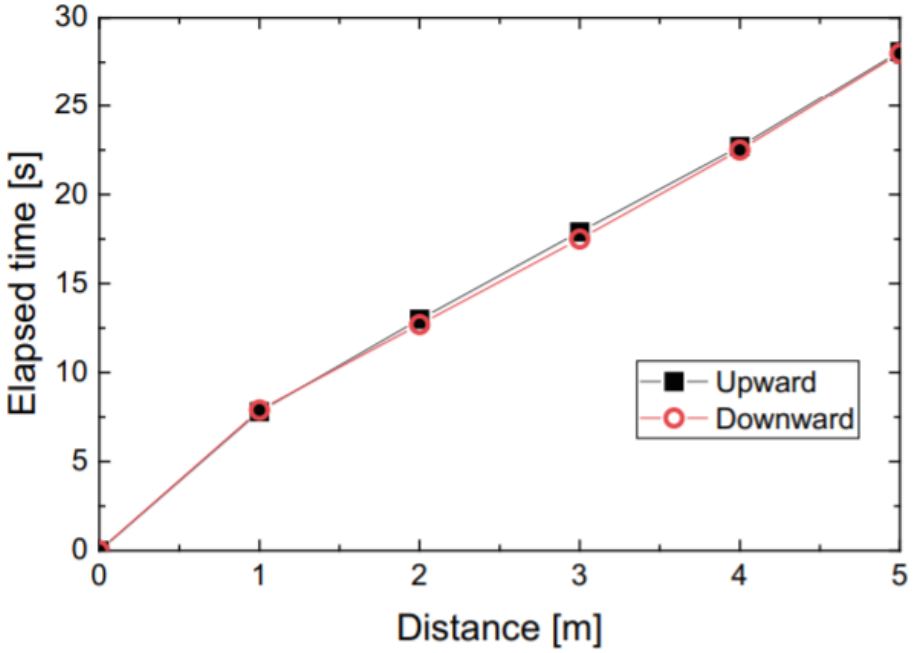
Direction	Driven blower
Forward	2, 2’
Upward	1, 3’
Downward	1’,3
Yaw turn (Right)	2’
Yaw turn (Left)	2

・前進
・上下移動
・ヨー角方向の回転

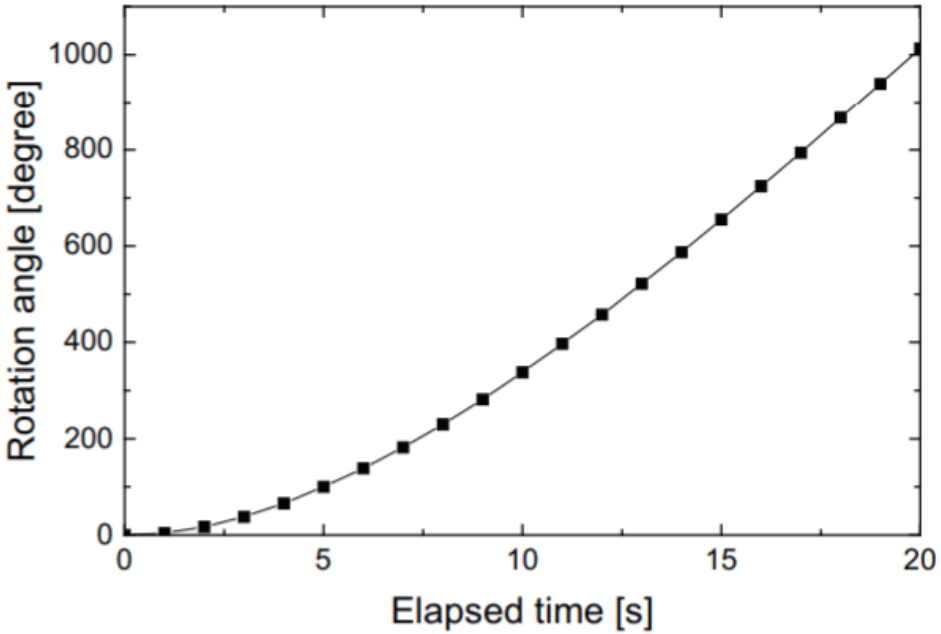


評価実験

運動性能



上下方向の移動速度



ヨー角方向の回転速度

- 最大移動速度(上下運動) : **20cm/s**
- 最大回転速度(20秒経過) : **80° /s**

評価実験

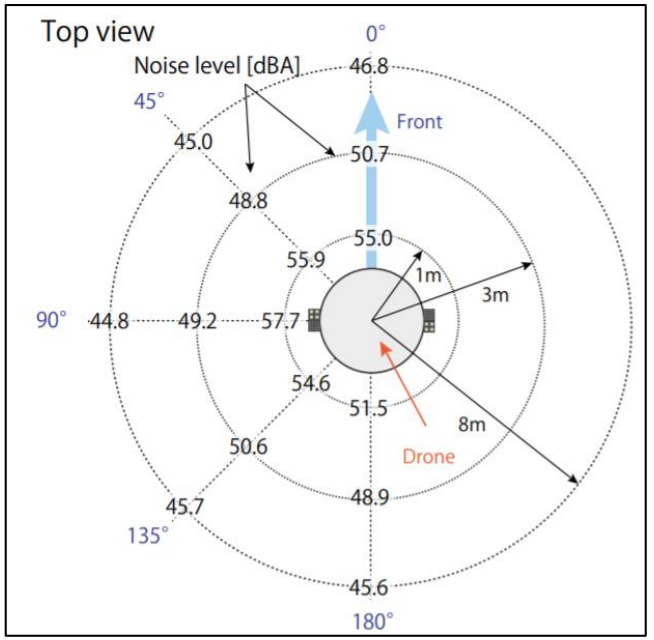
ノイズレベル

- 最大ノイズ(1m) : **57.7dBA**

↓

従来よりも大幅に静寂

(従来ドローン(8m) : 80dBA)



機体周辺のノイズレベル

飛行時間

- 約**30分間**制御可能
- 約**2週間**浮遊可能 (バッテリー切れによる制御不能後)

まとめ

ZeRONE

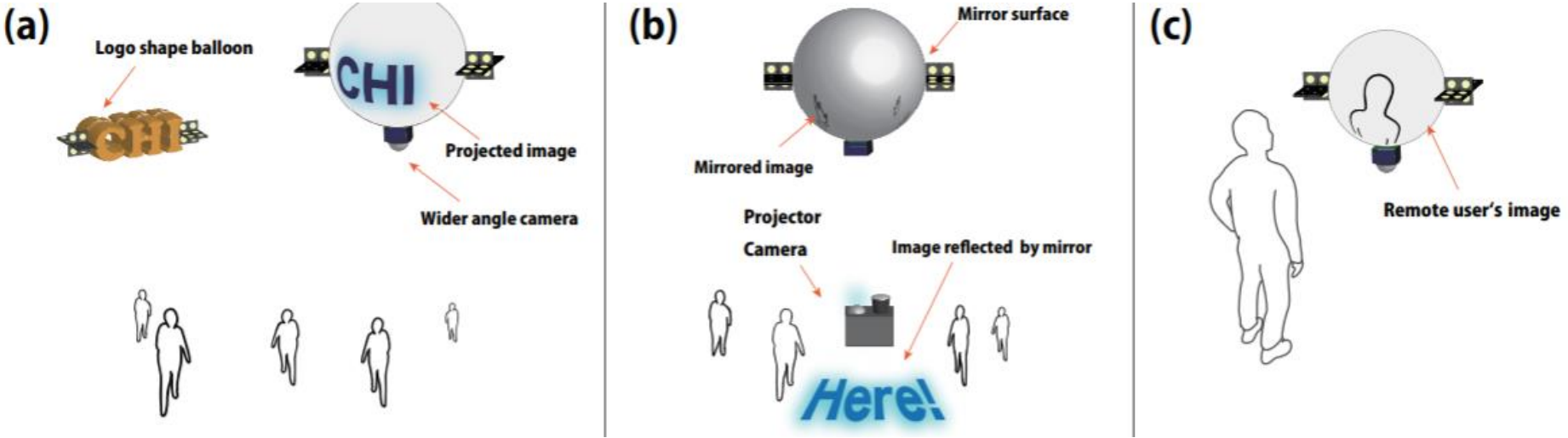
利点：

安全性と静寂性に優れた長時間飛行が可能なドローン

欠点：

推進力が弱く、慣性・風の影響を受けやすい

活用案

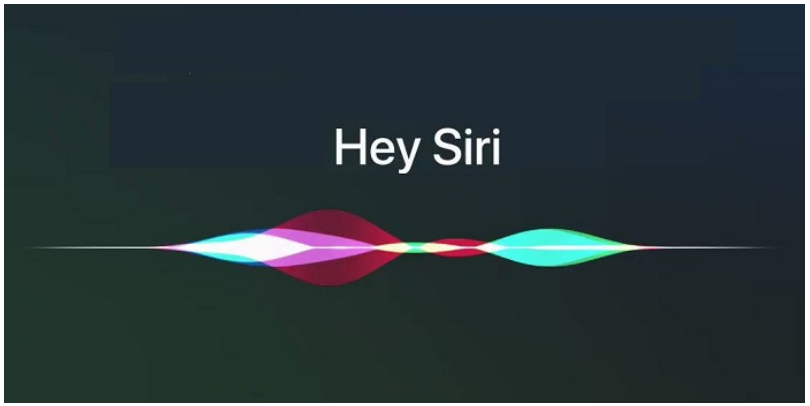


SottoVoce: An Ultrasound Imaging-Based Silent Speech Interaction Using Deep Neural Networks

宮坂　清貴

Background

- The availability of digital devices operated by voice is expanding



speech recognition

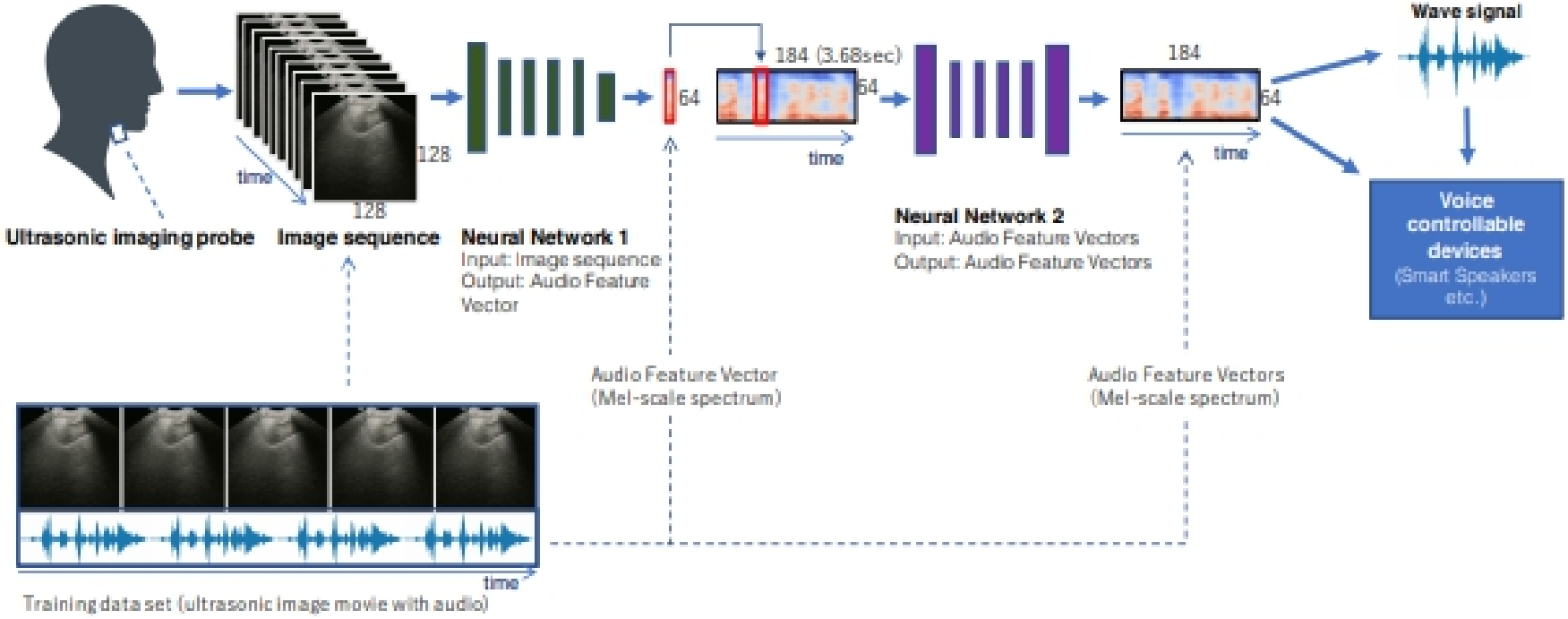
- Problems
  - Cannot be used in public places
  - Cannot be used in a noisy environment
  - Not confidential

- Solution
  - No voice speech recognition

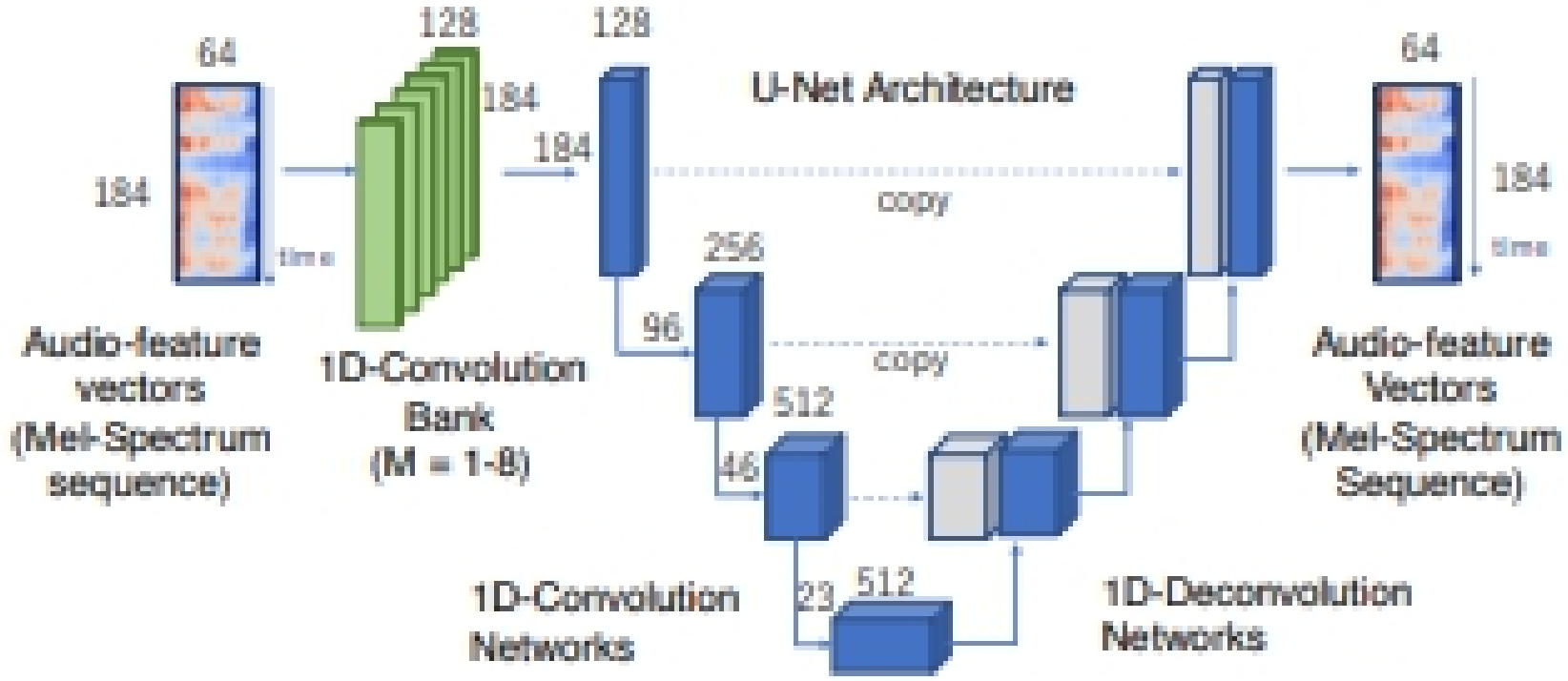
Method

- Ultrasound Imaging-Based Silent Speech Interaction

SottoVoce system overview



Network2


64
184
time
Audio-feature vectors (Mel-Spectrum sequence)
128
184
1D-Convolution Bank (M = 1-8)
128
184
U-Net Architecture
copy
256
96
copy
512
46
23
512
1D-Convolution Networks
1D-Deconvolution Networks
64
184
time
Audio-feature Vectors (Mel-Spectrum Sequence)

Training

- 500 speech commands
- two collaborators for data
- Training Network 1 required approximately 4 h
- Training Network 2 required approximately 1 h

Test

- four commands
  - Alexa, play music
  - Alexa, what's the weather like
  - Alexa, what time is it
  - Alexa, play jazz

	User A	User B	ave.
Network 1	60.0%	25.0%	42.5%
Network 1 + Network 2	65.0%	65.0%	65.0%
GT	90.0%	90.0%	90.0%

Problem

- Slow recognition(2.61 s)
- Low recognition rate
- Sound is hard to hear
- Few commands

“At Your Service: Designing Voice Assistant Personalities to Improve Automotive User Interfaces: A Real World Driving Study”

Michael Braun, Anja Mainz, Ronee Chadow itz,
Bastian Pfleging, Florian Alt

46193175 Koki Ebina

Outline

1. Introduction
2. Characterize
3. Real world driving study
4. Result
5. Conclusion

Introduction

- Voice assistants are becoming a pervasive means of inter action in automotive UIs
- Voice assistants offer:
  - Minimizing driver distraction during manual driving
  - More natural user experience (UX)
- Current voice assistant can:
  - Understand natural language
  - Express information through speech synthesis

Most of them lack an inter personal level of communication

Satisfying the expectations of users have towards social interaction is needed

Introduction

Personalized voice assistants may affect trust, UX, acceptance and workload in the real world

However, it is so far unclear how affect

Designing a set of personalized voice assistants and tested them in a real-world driving study

Objective

Evaluating the affect of personalized voice assistants on these factors compare to non-personalized voice assistants

Characterize

Pre-study

- Subjects:
  N=19 (12 male, 7 female, 19-53 years)
- Procedure:
  Experiencing 6 scenarios with 8 voice assistant, adding up to 48 total interactions
- Results of questionnaires:
  - Assistants with a perceived friendly attitude were liked
  - Unfriendly behavior and excessive talking were identified as negative traits

→ Distance between assistant and user

→ The balance of power within the conversations

are considered as an important aspect to be felt as friendly

Characterize

From the feedback of pre-study:

- Hostile assistant were removed
- Introducing the dimension “professionalism” (which defines the level of casual or formal behavior)

Final characters

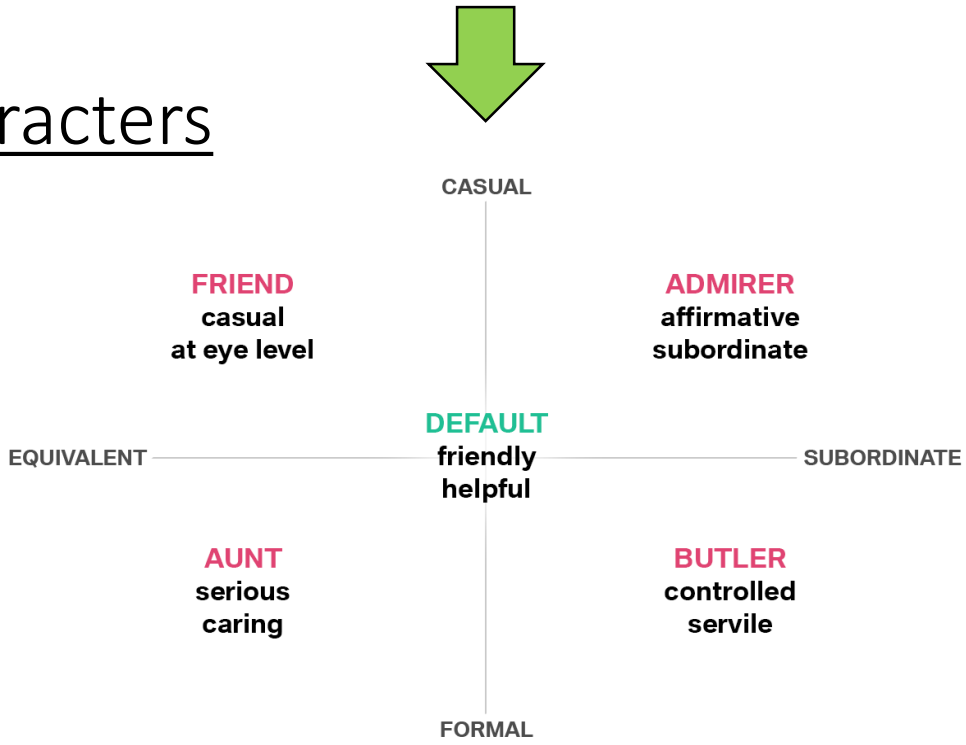


Fig. 1: The models of personalized voice assistant

Real world driving study

- Subjects:
  N=55 (45 male, 10 female, 23-60 years). They answered the questionnaire to select a fitting assistant in advance
- Procedures:
  - The subjects drove a car and experienced interaction with voice assistant.
  - The operators sitting in the back of driver and triggered the use cases in appropriate situations

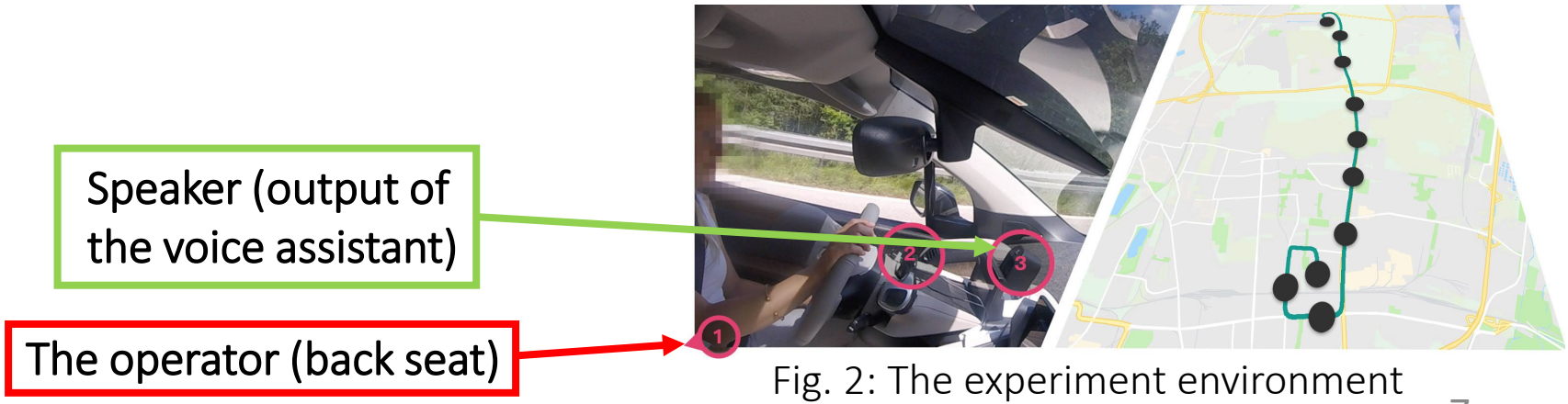


Fig. 2: The experiment environment inside the car and driving route

Real world driving study

- Procedures:
  - Each subjects experienced two ride
    (With recommended assistant and with default assistant)
  - 12 use cases were triggered (which can split into 3 clusters:
    Driving related, Proactive assistant, and connected car)
- Evaluation:

  <u>After each use case</u>
  - Rating the interaction verbally (good, neutral, bad)

  <u>After the ride</u>
  - Answering the questionnaires, and giving feedback for the experienced character
  - Listening all 5 characters and decided which characters they would like to use in the future

Result

- 4 characters assigned to subjects by the deciding tree from the result of the questionnaires

Friend	Butler	Aunt	Admirer
21	16	15	3*

* The data of admirer was excluded from the analysis because low number of subjects

- Subjects were divided into 2 groups based on the result of the questionnaires

  Correct matching : who chose suggested personalized characters (*N*=16)

  Incorrect matching: who chose other characters (*N*=39)

- About Trust, Likability, Usefulness, and satisfaction were evaluated by a 7 point evaluation (-3 to +3)

Result

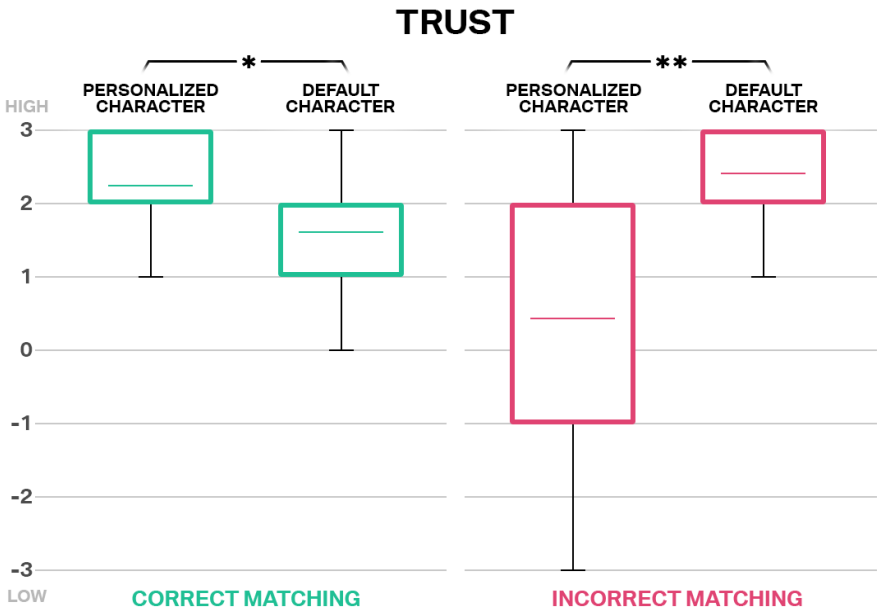


Fig. 3: The result of the T-test about the trust (*p<0.05, **:p<0.01)

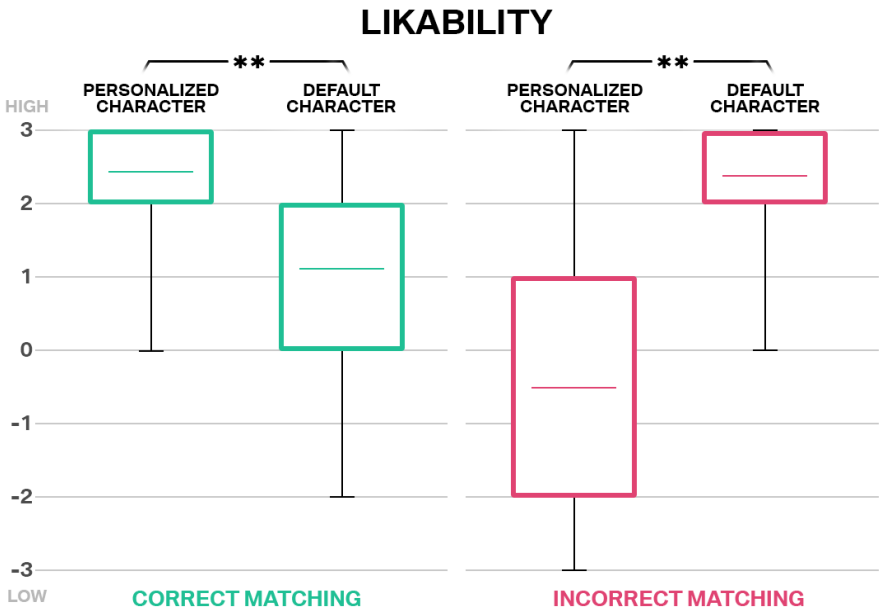


Fig. 4: The result of the T-test about the likability (*p<0.05, **:p<0.01)

- Correct matching group: the scores of trust and likability are higher than that of default characters
- Incorrect matching group: the scores of trust and likability are higher than that of personalized characters

Result

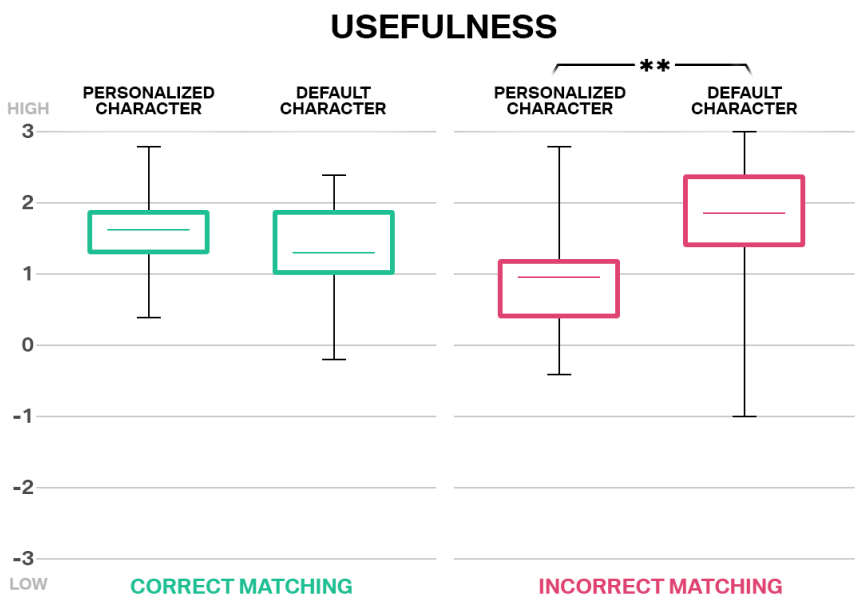


Fig. 5: The result of the T-test about the usefulness (*p<0.05, **:p<0.01)

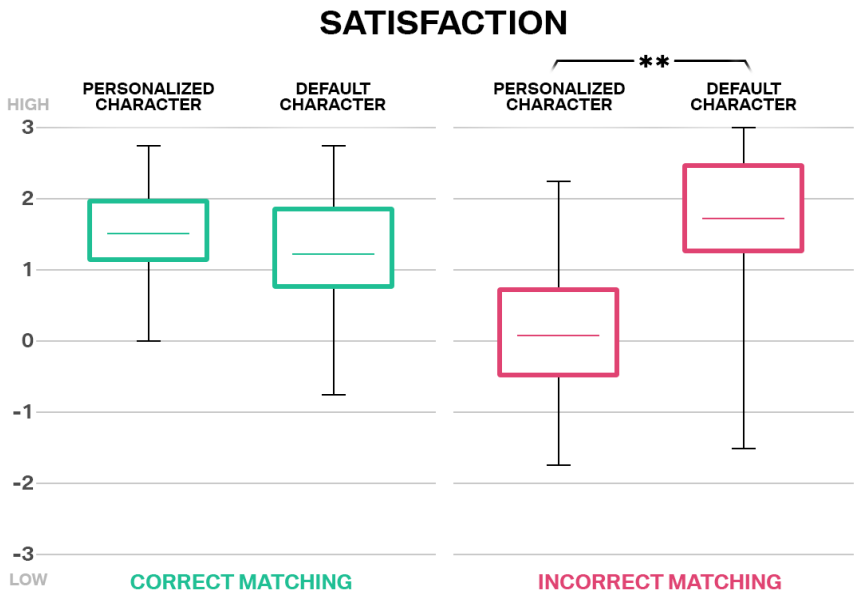


Fig. 6: The result of the T-test about the satisfaction (*p<0.05, **:p<0.01)

- Correct matching group: the scores of usefulness and satisfaction are same as that of default characters
- Incorrect matching group: the scores of usefulness and satisfaction are higher than that of personalized characters

Conclusion

- If the voice assistant matches the user's personality, personalization has a positive effect on trust and likability
- Mismatch cause displeasure, and in the case, default characters were preferred.

A neutral assistant is recommended as starting point before gradually adjusting its personality to the user's needs

Thank you for your kind attention