INTERACTIVE DIRECTION GIVING AGENT

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INTRODUCTION

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WHY ?

DIFFICULT TASK

Direction giving is a difficult task because of the ambiguity and versatility of the real world.

MAPS CAN BE MISLEADING

Maps can be difficult to read on a small screen and even dangerous if the user needs to interact with them

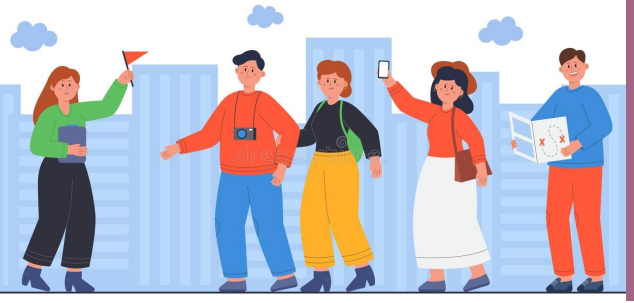
COMPREHENSION ISSUES

Incomprehension are common, and even more with synthetic voices. They often lead to a failure in the task in case of direction giving agent and need to be corrected

ENJOYABLE CONVERSATIONS

Most of the people don't enjoy looking at virtual map. Some have a preference for asking for indications. What if they could use the data of a map and at the same time enjoy an interaction with a conversational agent?

RESEARCH QUESTIONS



RESEARCH QUESTION 1

What grounding strategies do humans use to improve direction giving efficiency?

RESEARCH QUESTION 2

Can grounding strategies in a direction giving agent replace the use of a map?

HUMAN-HUMAN CORPUS

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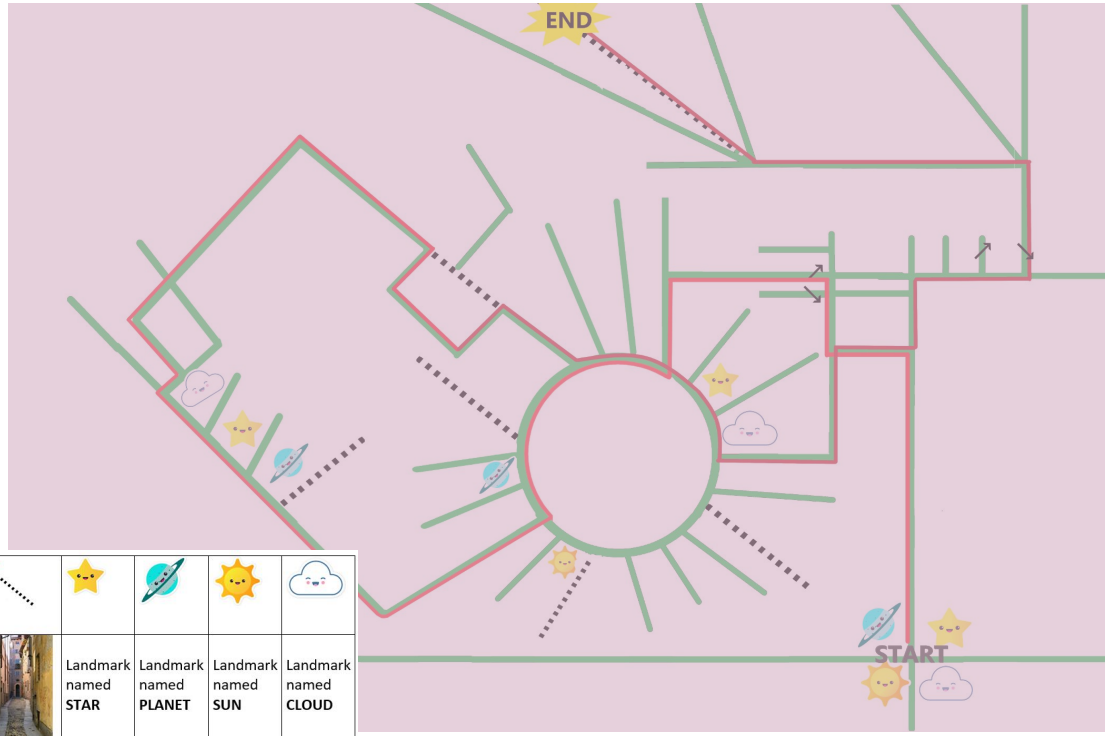
DATA COLLECTION

6 couples
- ENS students
- 7 males and 5 females
- 5 different L1s, fluent English L2

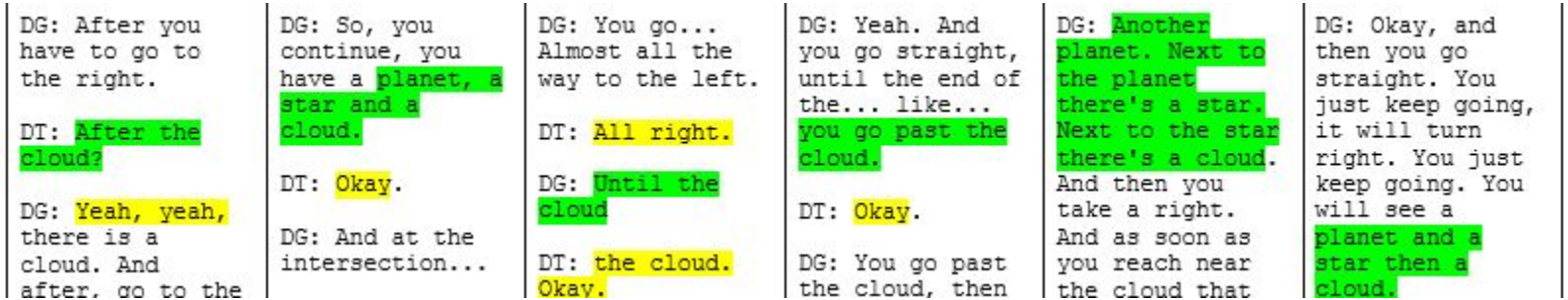
1 Direction giver
1 Direction taker



DATA COLLECTION

Transcripts:

- Alignment based on direction change



Q1
What grounding strategies do humans use to improve direction giving efficiency?

DATA INTERPRETATION

GUIDEES (→ users)

It is very rare that direction-takers don't take a turn after the new direction is given.

1. When understanding:
   - backchannels
   - repetition of the information

2. When not understanding or unsure:
   - rephrasing
   - ask for further information.

DATA INTERPRETATION

GUIDES (→ agent)

- They usually wait for backchannels from their listeners (in 5 out of 6 couples), interrupting their own turn at every new direction.
- When reformulating instructions → Important role of landmarks

Q1.
What grounding strategies do humans use to improve direction giving efficiency?

DT: right in the left, like...

DG: the one which is EXACTLY on the left!

DT: Okay! The left one, okay.

DG: After, you have to go to the right.

DT: After the cloud?

DG: Yeah, yeah, there is a cloud. And after, go to the right.

AGENT DESIGN

03

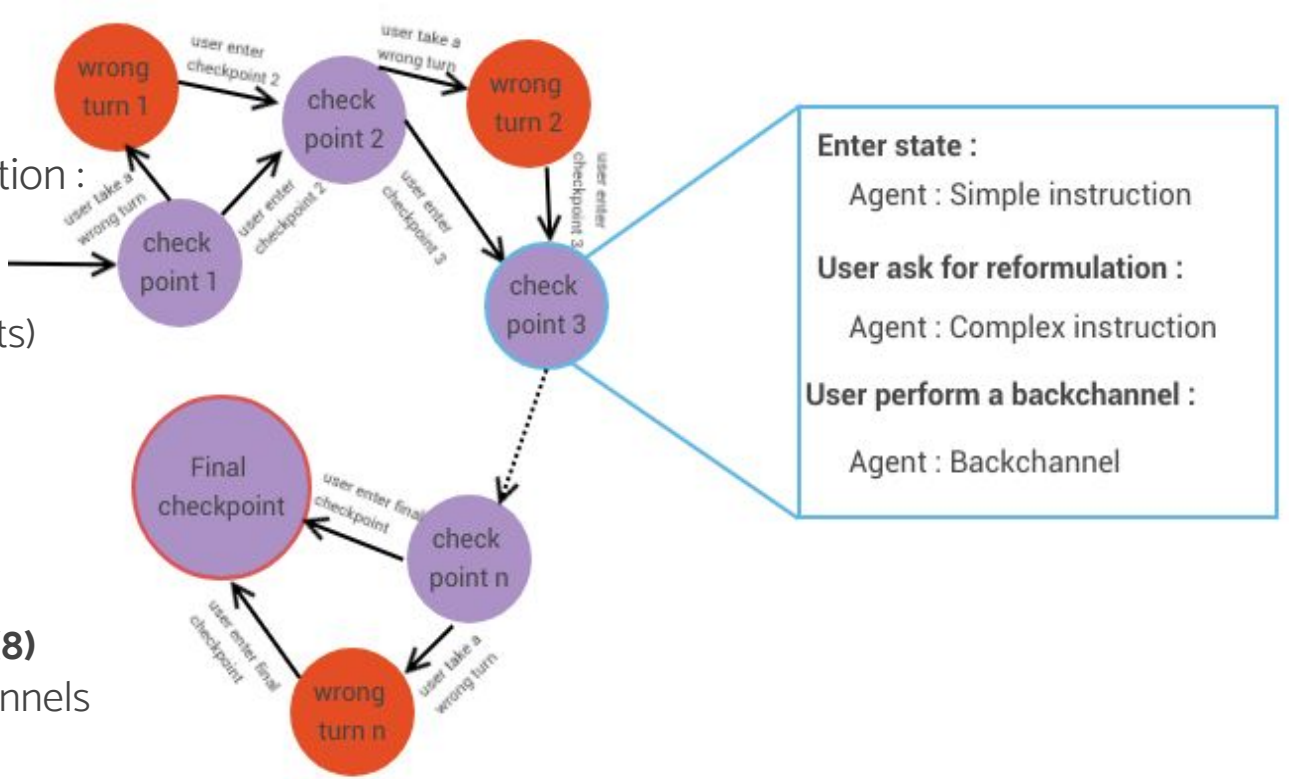
INSTRUCTION DESIGN

2 versions for each instruction :

1. **Simple version**
(first input for the participants)

2. **Complex version**
(extracted from the corpus)

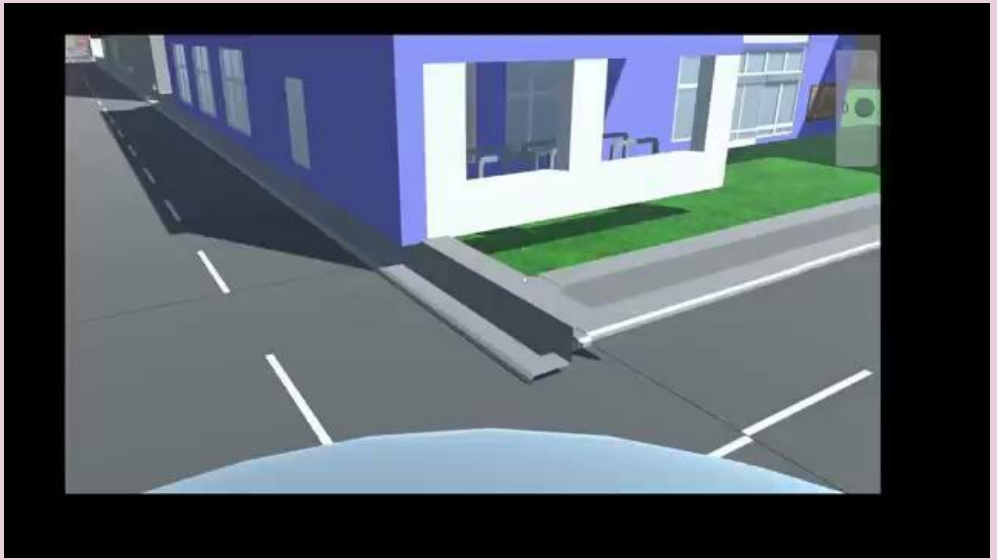
\+ users' **backchannels (8)**
→ assistant's backchannels



IMPLEMENTATION

- **Unity Game engine** and **Microsoft Azure**

- No language understanding module (**list of possible backchannels** inferred from the corpus)



USER STUDY

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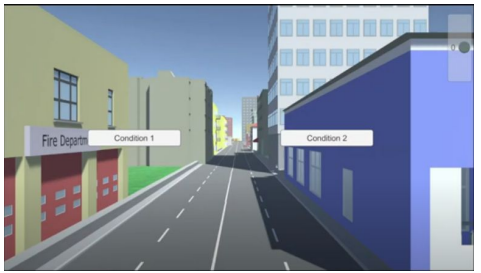
4. USER STUDY

PRE-QUESTIONNAIRE

- Sex
- Familiarity with videogames
- Relationship with assistants (frequency, liking, usefulness)

SIMULATION

- 10 participants
- 2 conditions : interactive and map based
- instructions (get the coins, reach the end quickly, map and interaction possibility when appropriate)



POST-QUESTIONNAIRE

- Perception of the interaction
- Perception of the agent
- Open feedback

CONTROL VARIABLES

VIDEO GAME ABILITY

- May have an impact on the command use
- Significantly unequally distributed across conditions

ASSISTANT PERCEPTION

- May have an impact on the agent use
- Significantly unequally distributed across conditions

SEX

- May have an impact on navigation
- Equally distributed across conditions

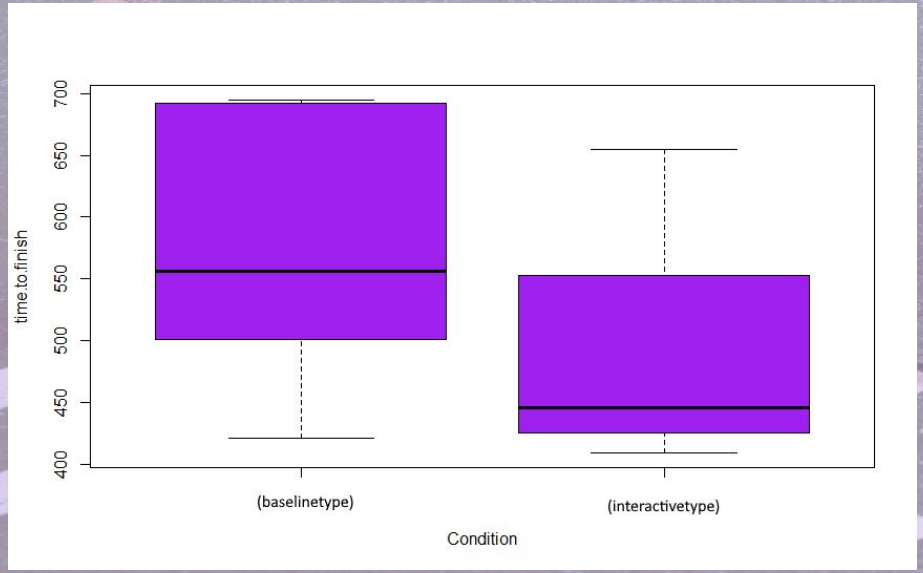
4. USER STUDY

RQ2.
Can grounding strategies in a direction giving agent replace the use of a map ?

H1 : The interactive condition is **more efficient** than the baseline condition.

EFFICIENCY : TIME

- Linear regression to take controls into account
- interactive condition 100s faster than baseline
- no significant effect (p=0,4)



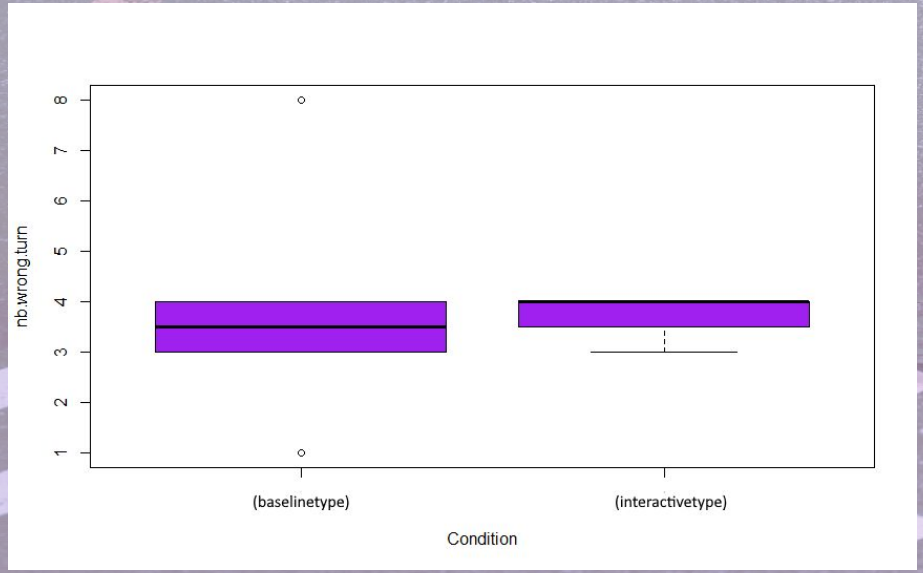
4. USER STUDY

RQ2.
Can grounding strategies in a direction giving agent replace the use of a map ?

H1 : The interactive condition is **more efficient** than the baseline condition

EFFICIENCY : WRONG TURNS

- Linear regression to take controls into account
- interactive condition : -0,16 (p=0,91)
- significant videogame ability effect : -0,79 (p=0,1)



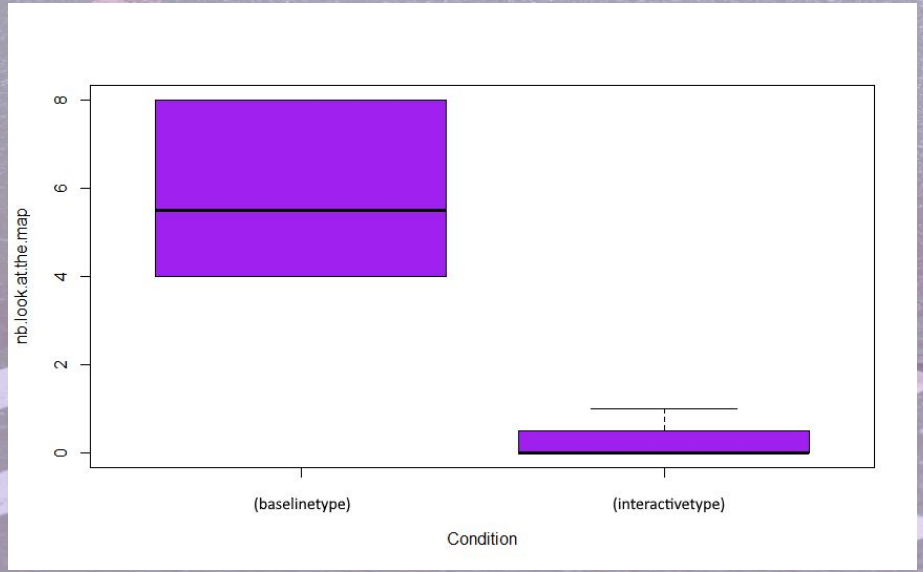
4. USER STUDY

RQ2.
Can grounding strategies in a direction giving agent replace the use of a map ?

H1 : The interactive condition is **more efficient** than the baseline condition

EFFICIENCY : LOOK AT THE MAP

- Linear regression to take controls into account
- significant interactive condition effect : -5,75 (p=0,01)



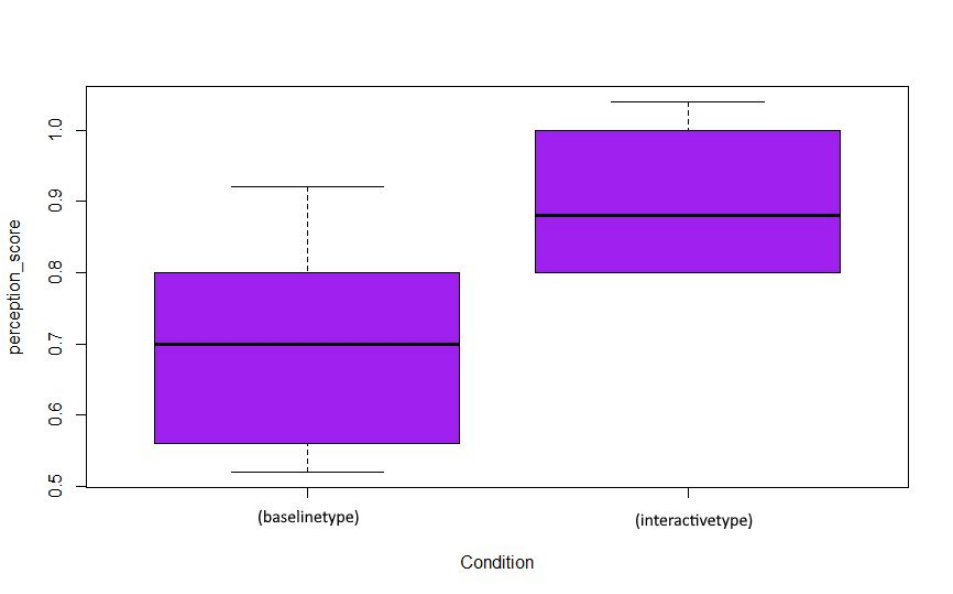
4. USER STUDY

RQ2.
Can grounding strategies in a direction giving agent replace the use of a map ?

H2 : The interactive condition is **better perceived** than the baseline condition

PERCEPTION :

- Linear regression to take controls into account
- significant interactive condition effect : 0,37 (p=0,007)



CONCLUSION

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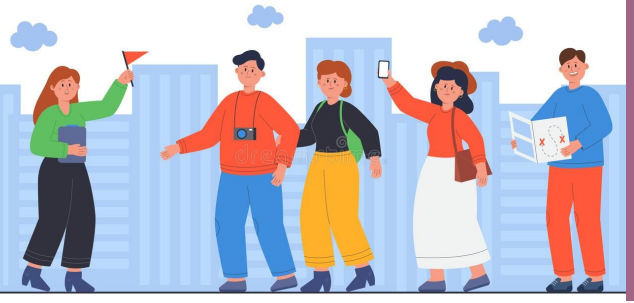
RESEARCH QUESTIONS



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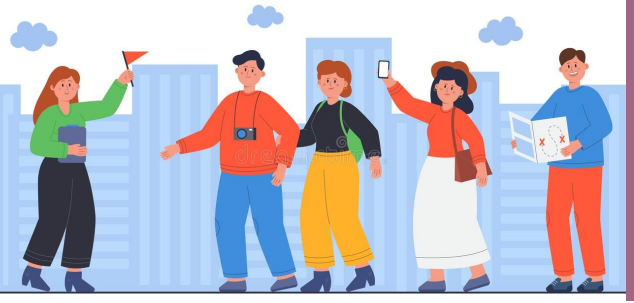

RESEARCH QUESTION 1

What grounding strategies do humans use to improve direction giving efficiency?

Guided :

Signal understanding through **backchannels**
Ask for confirmation
Ask for **further instructions**

Guide :

Wait for **backchannels**
Repeat or **reformulate instructions**

5. CONCLUSION

RESEARCH QUESTIONS

- Interactive agent is **perceived significantly better** than a map based application
- Interactive agent **seems to be more efficient** than a map based application
  - ≫ need a bigger user study

RESEARCH QUESTION 2

Can grounding strategies in a direction giving agent replace the use of a map?

5. CONCLUSION

LIMITATIONS

- **Size** of the user study
- **Bugs** in the program that should have been corrected with a pre-run
- **Simplification of the strategies** and no ability to answer precise questions

FUTURE WORKS

- Take the **frequency/the presence of backchannels** into account
- Add a **language understanding module**
- **Bigger user study**

QUESTIONS TIME!

POSSIBLE DISCUSSION TOPICS :

1. Interacting with a direction-giving conversational agent could someday be a similar experience to asking directions to a person in the street?

2. Would personally use it? Why and if yes, in which occasion (walking, driving, riding a bike…)?

Instructions for replication and paper available at :
https://github.com/lgoue/Interactivedirection

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