ÉCOLE POLYTECHNIQUE
FÉDÉRALE DE LAUSANNE

You're Doing It Wrong!

Studying Unexpected Behaviours in Child-Robot Interaction

ICSR 2015 – Séverin Lemaignan, Julia Fink, Francesco Mondada, Pierre Dillenbourg

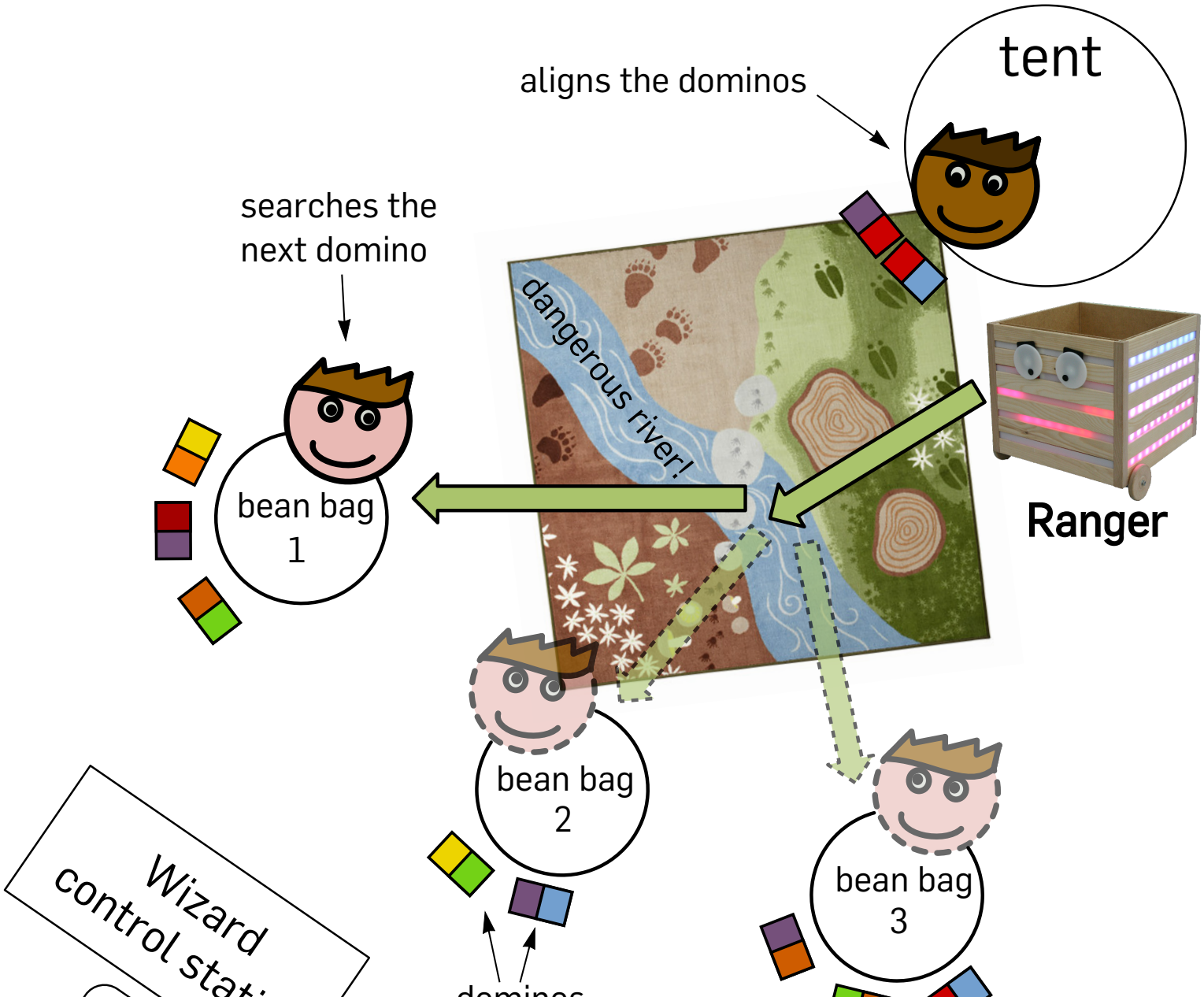
Presented by Alexis Jacq

Computer-Human Interaction
for Learning and Instruction **EPFL**


Ranger
designed to encourage children to tidy up their room

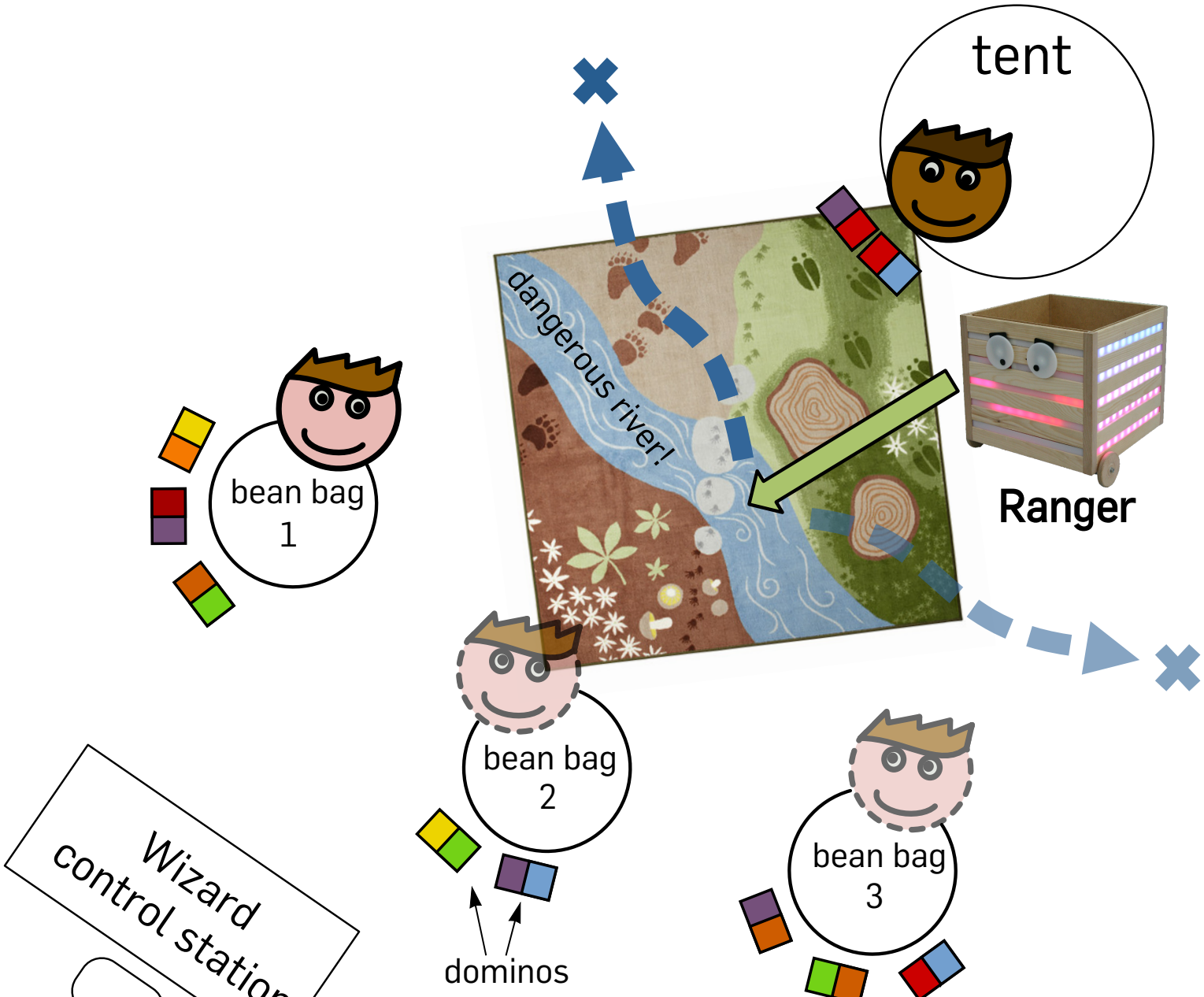
THE ACTIVITY

DOMINOS GAME

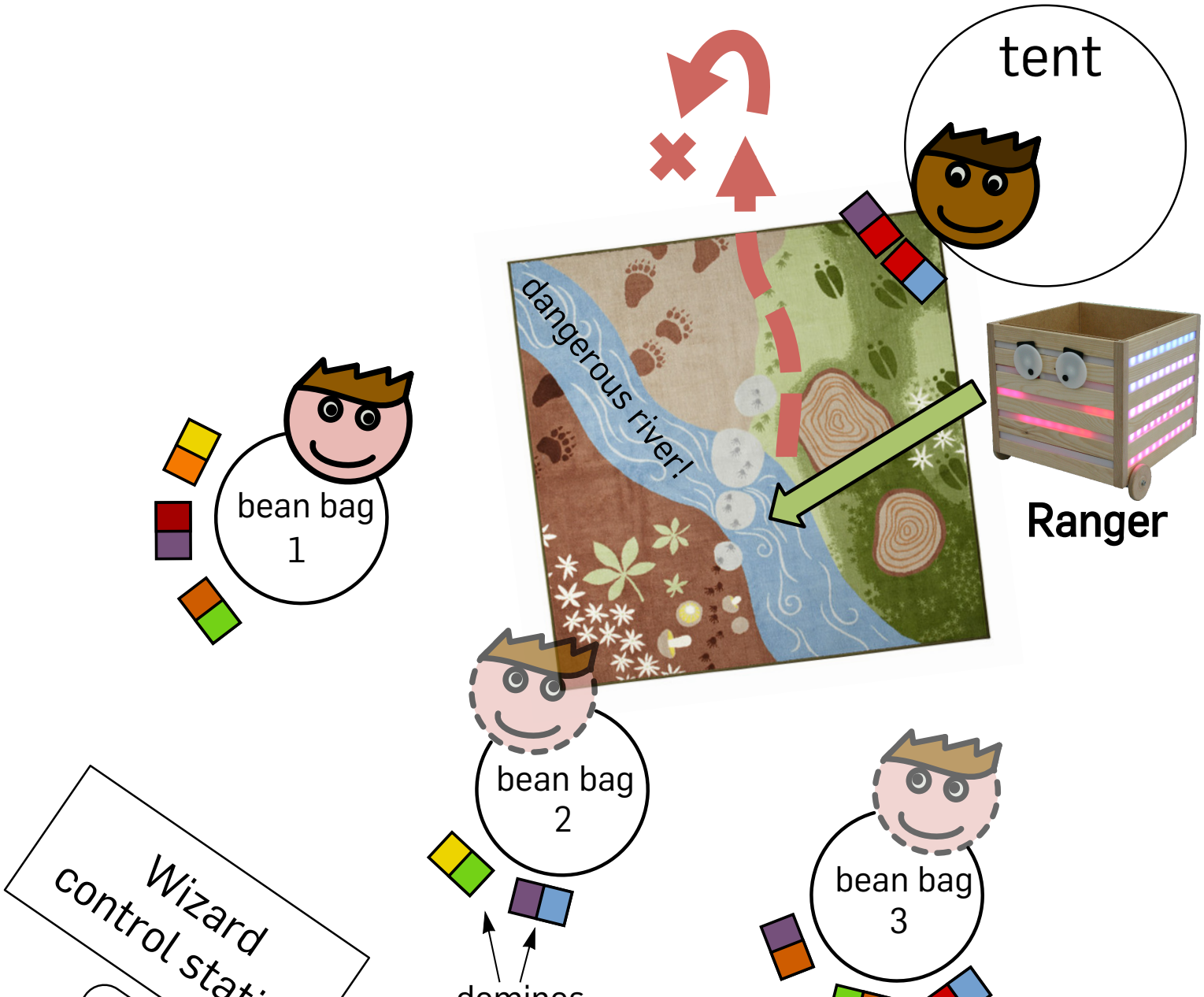


UNEXPECTED BEHAVIOUR, YOU SAID?

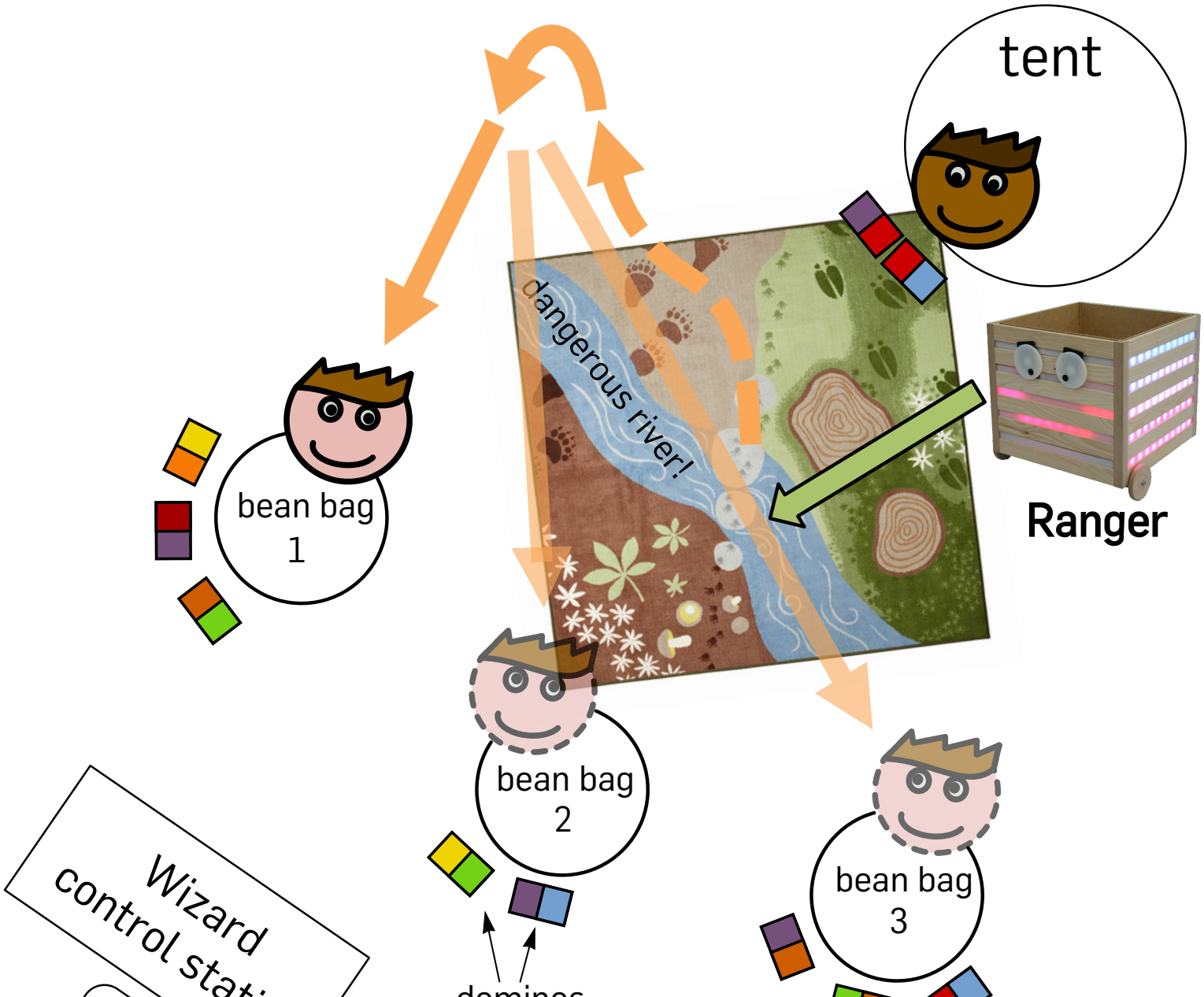
LOST CONDITION



DISOBEY CONDITION



MISTAKE CONDITION



WHAT HAPPEN WHEN A ROBOT DOES NOT OBEY?

TWO HYPOTHESES

1. **A robot that mis-behaves from time to time is more engaging**

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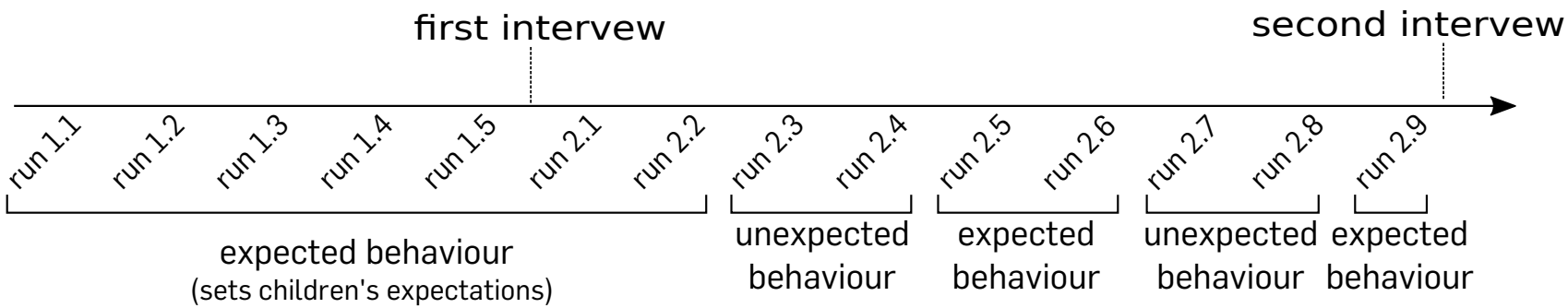
2. **The way the robot "mis-behaves" betrays its cognitive capabilities**

THE EXPERIMENT

- 13 pairs of children, 4-5 years old;
- Between subject: each pair sees one type of mis-behaviour;
- 14 turns per pair, alterning correct behaviours with mis-behaviours – 14 min per group in average;
- Interactions video-recorded and annotated;
- Two interviews, in the middle of the experiment and at the end.



ANALYSIS

TWO DIMENSIONS

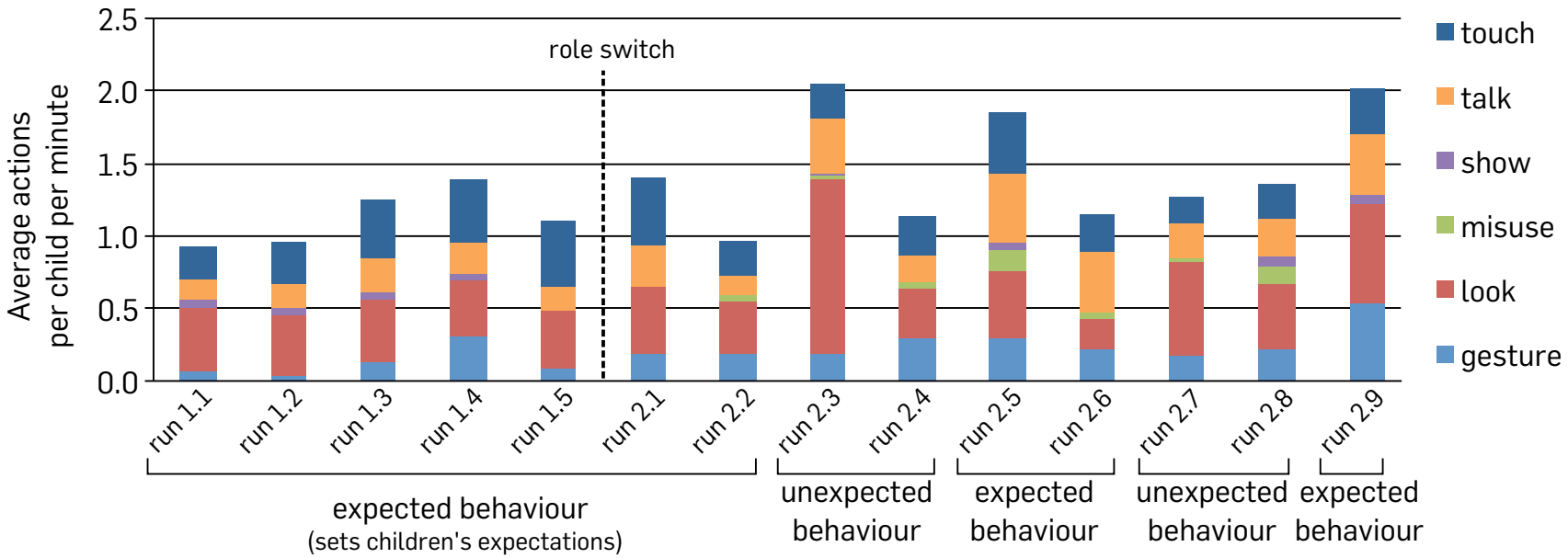
- Analyse of the **behaviour**: actions towards the robot, measured by annotating the videos;
- Analyse of the **perception**: interviews.

BEHAVIOUR TOWARDS THE ROBOT

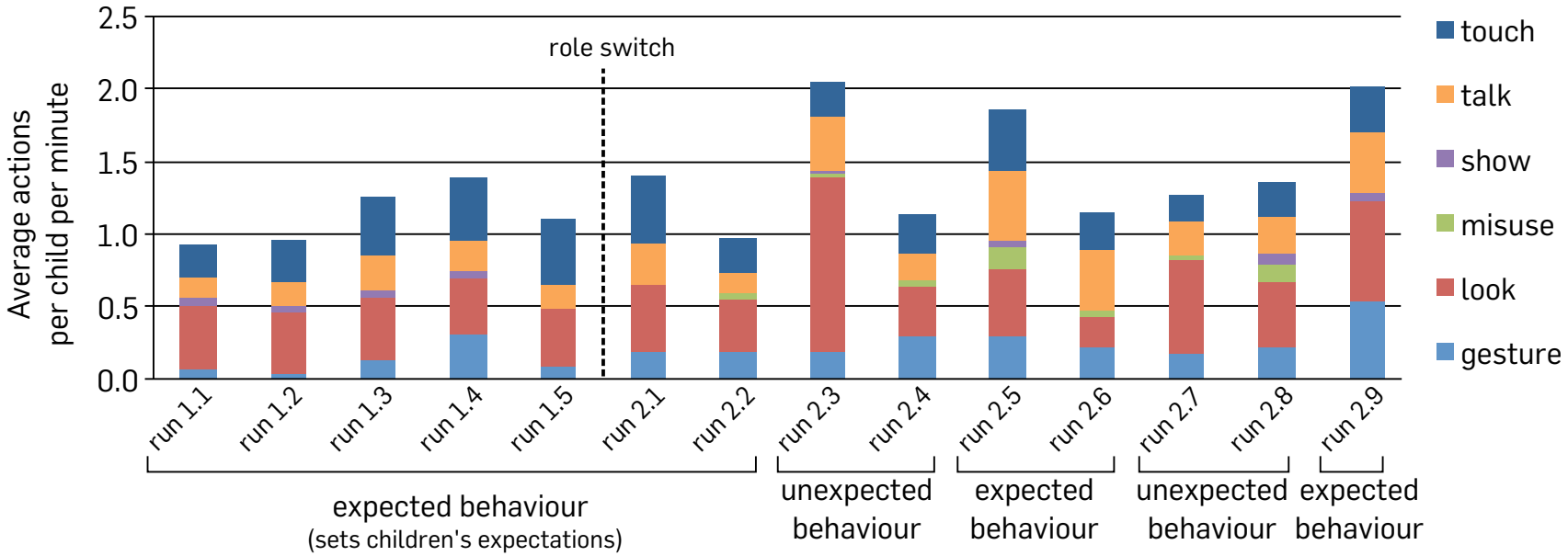
Manual annotation of the video records:

- **Touching** the robot;
- **Talking** to the robot;
- **Showing objects** to the robot;
- **Mis-using/mis-behaving** with the robot;
- **Looking at the experimenter** (as a measure of "what happen? what's wrong with the robot?");
- **Gesturing** in front of the robot (waving the hand, etc.)

RESULTS

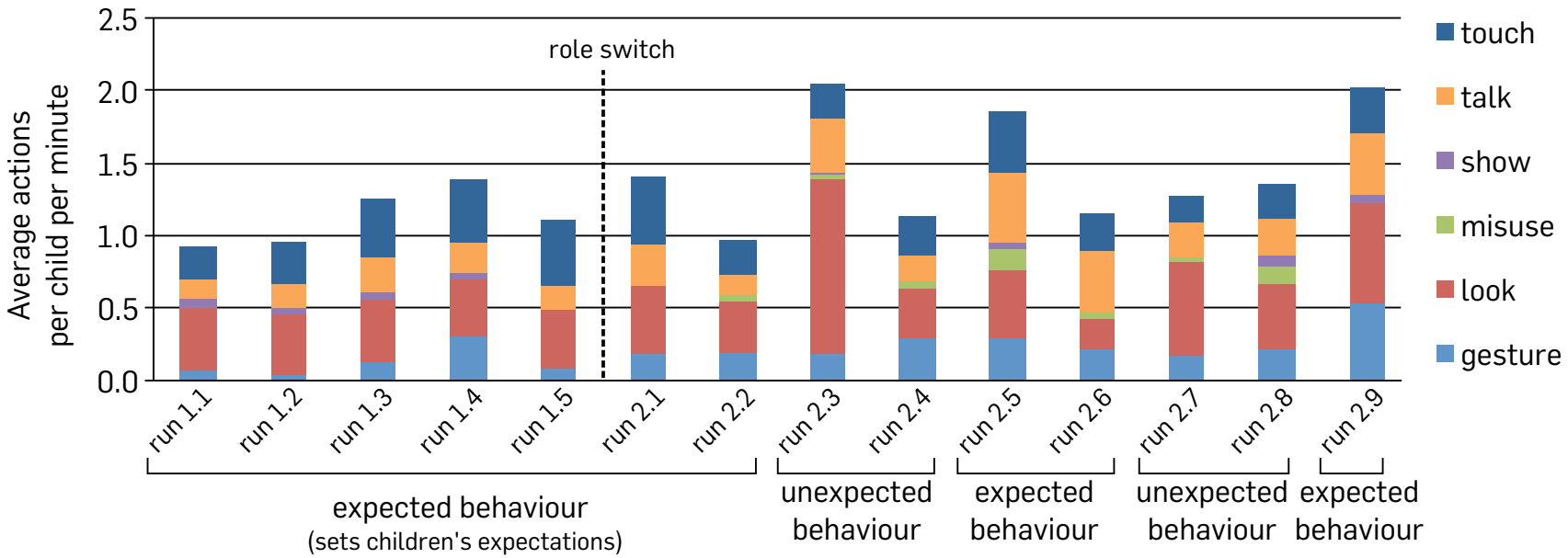

Average actions per child per minute
2.5
2.0
1.5
1.0
0.5
0.0
role switch
touch
talk
show
misuse
look
gesture
run 1.1
run 1.2
run 1.3
run 1.4
run 1.5
run 2.1
run 2.2
run 2.3
run 2.4
run 2.5
run 2.6
run 2.7
run 2.8
run 2.9
expected behaviour
(sets children's expectations)
unexpected behaviour
expected behaviour
unexpected behaviour
expected behaviour

RESULTS



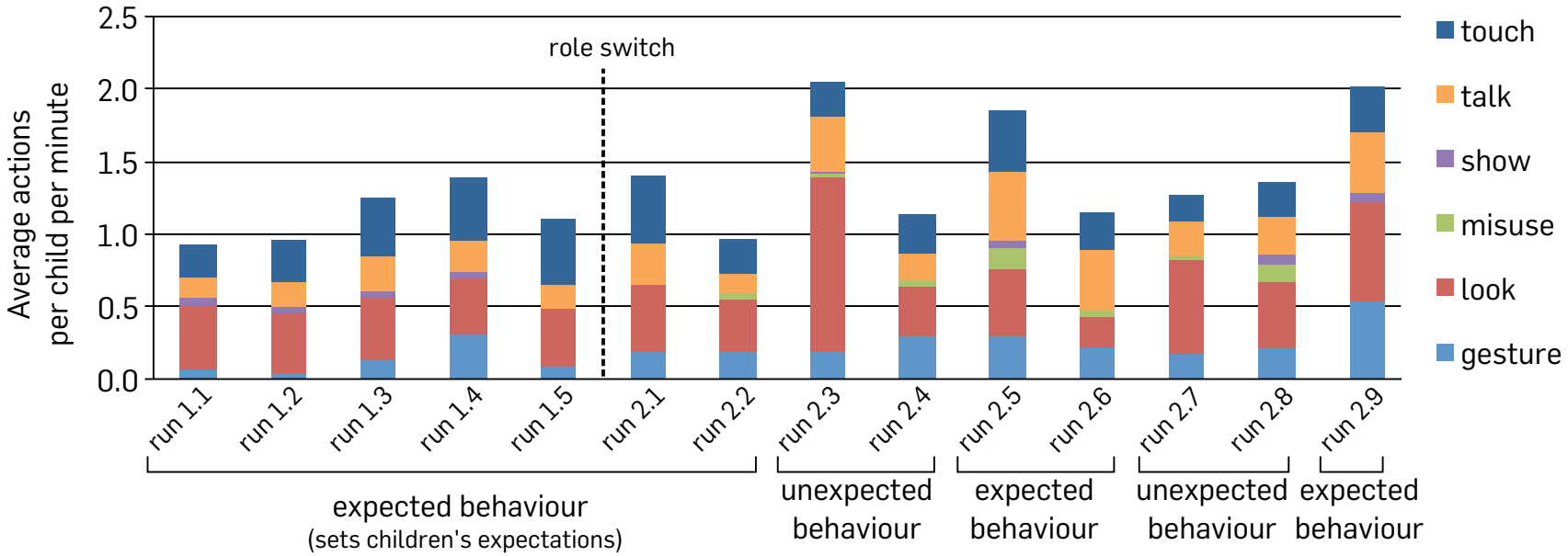
We find significantly more actions toward the robot once the robot starts to mis-behave.

RESULTS



Hyp. 1 is supported: mis-behaviours support engagement, at least for such short interactions. Not un-expected!

RESULTS



However, no significant differences between conditions:
We do not measure a change of children's behaviour with different kind of mis-behaviours.

PERCEPTION OF THE ROBOT: INTERVIEWS

Expectations

How do you imagine a robot?
What could it look like?
Have you ever seen a robot before?

Impression

When you first saw R, what did you think?
Is R a robot? How do you know?
Did you expect R would come over to you when you call it?
What happened when you put the domino in the box?

Ascribe intention

Do you think R could go out the door all by itself?
Does R always obey / come over to you?
Could R do something silly?
Why did R not come over to you when you called it?

Ascribe perceptual capabilities

Here is a domino. Do you think R can see it?
When I say "Hello R!", do you think R can hear it?

Ascribe emotional state

Does R have feelings? Can R be happy or sad sometimes?

Social acceptance

Do you like R? Why (not)?
What do you (not) like about it?
Would you like to have R at home?

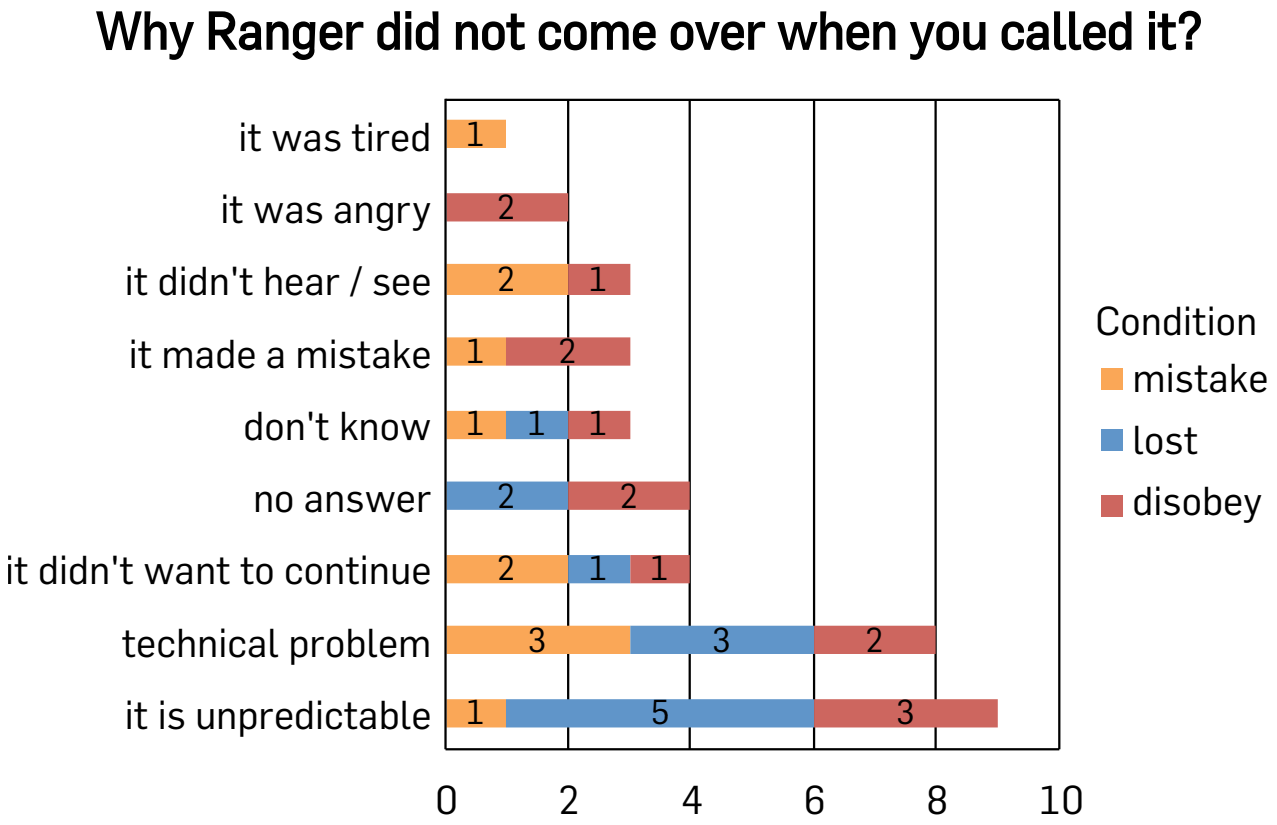
Companionship

Could R be your friend? Why (not)?

Ascribe moral standing

Assume you go on a holiday for two weeks. Is it alright to leave R alone at home? Why (not)?

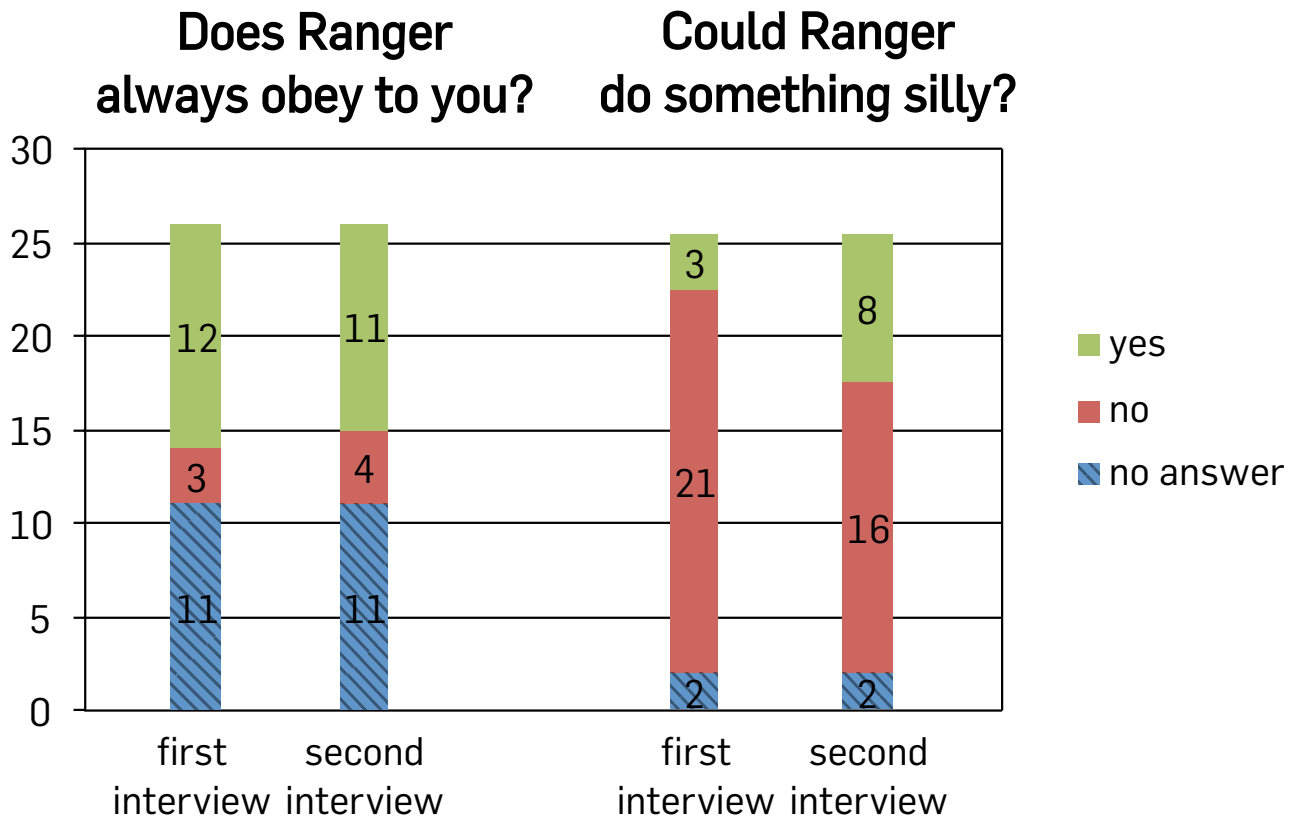
RESULTS: MANIPULATION RECOGNITION



Poor recognition of the different kind of mis-behaviours!

Children too young?

RESULTS: ATTRIBUTION OF INTENTIONALITY



Children **do not seem to attribute more intentionality** to the robot, irrespective of the type of mis-behaviour (the robot "always obey"). Interestingly, the children did nonetheless ascribe perceptual cognitive capabilities (like seeing or hearing).

TAKE HOME MESSAGE(S)

REMINDER: OUR TWO HYPOTHESES

1. **A robot that mis-behaves from time to time is more engaging:** ✓
2. **The way the robot "mis-behaves" betrays its cognitive capabilities:** ✗

Thank you!

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