ÉCOLE POLYTECHNIQUE
FÉDÉRALE DE LAUSANNE

You're Doing It Wrong!

Studying Unexpected Behaviors in Child-Robot Interaction

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

Presented by Alexis Jacq

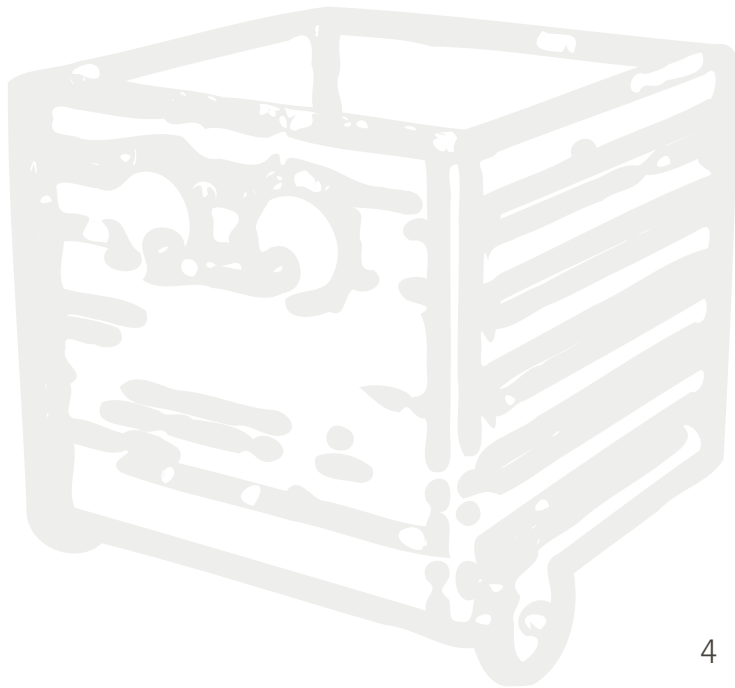
Computer-Human Interaction
for Learning and Instruction **EPFL**

WHAT HAPPEN WHEN A ROBOT DOES NOT OBEY?

NO, I DON'T WANT YOUR TILE!

TWO HYPOTHESES

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



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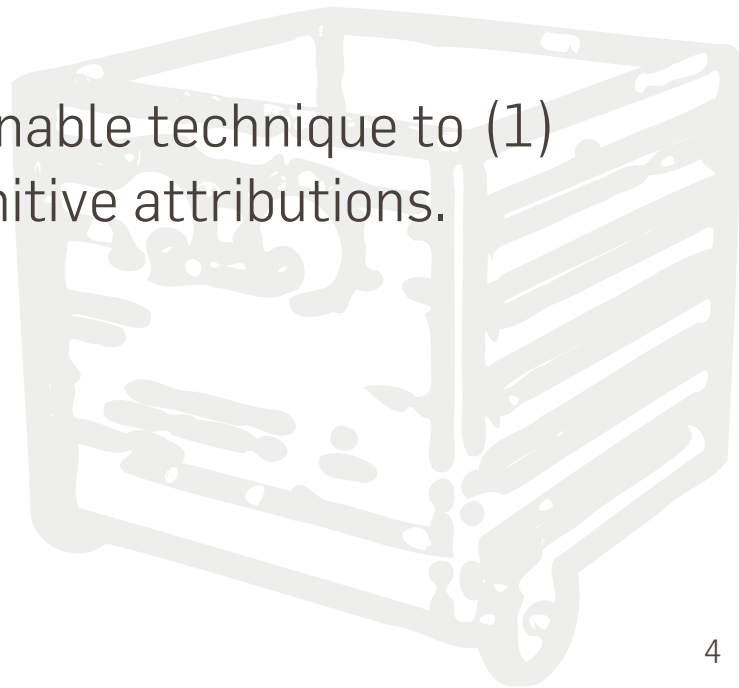
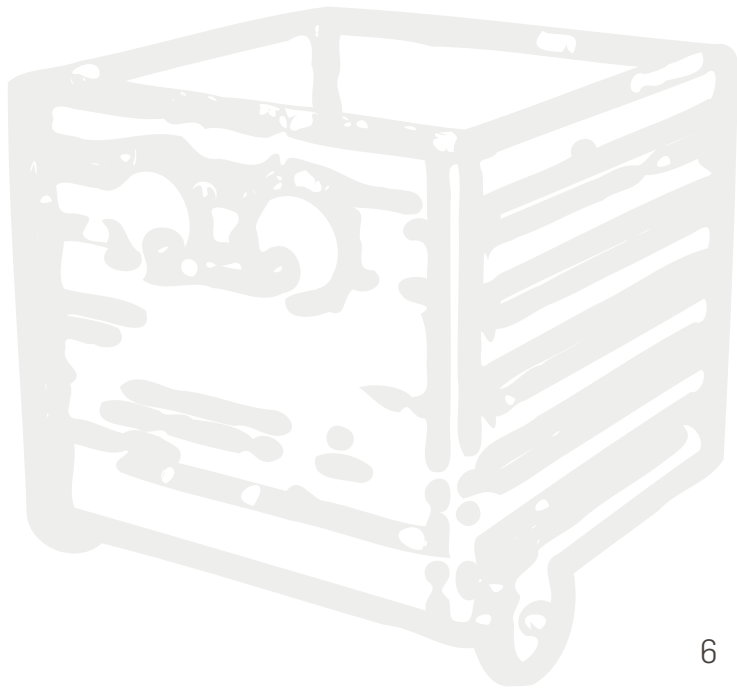
If that's indeed the case, we gain an actionable technique to (1) sustain engagement, (2) influence on cognitive attributions.



UNEXPECTED BEHAVIOUR, YOU SAID?

DESIGN OF THREE BEHAVIOURS

1. the robot get **LOST**, for no visible reason;
2. the robot **DISOBEY**;
3. the robot makes a **MISTAKE**.



LOST CONDITION

...induces the perception of a contingent malfunction
(My robot has a **bug**!)

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Hypothesis: decreased attribution of human-likeness

DISOBEY CONDITION

...induces the perception of a robot's **own will**

DISOBEY CONDITION

...induces the perception of a robot's **own will**

Hypothesis: increased attribution of human-likeness

MISTAKE CONDITION

The robot goes wrong, but recognizes the error and repairs.

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To err is human. And the robot is aware of its own state (introspection) and of the expected state of interaction.

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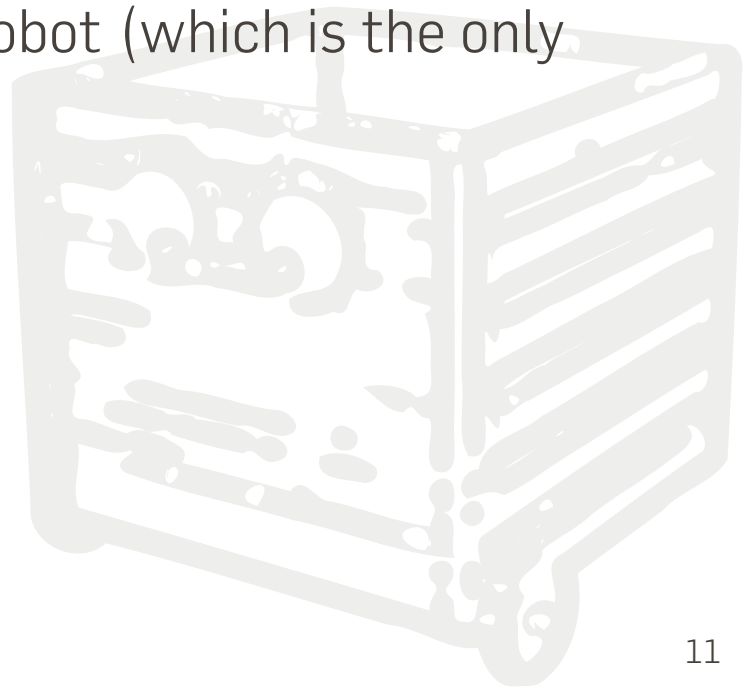
EXPERIMENTAL PROCEDURE: THE DOMINOS TASK

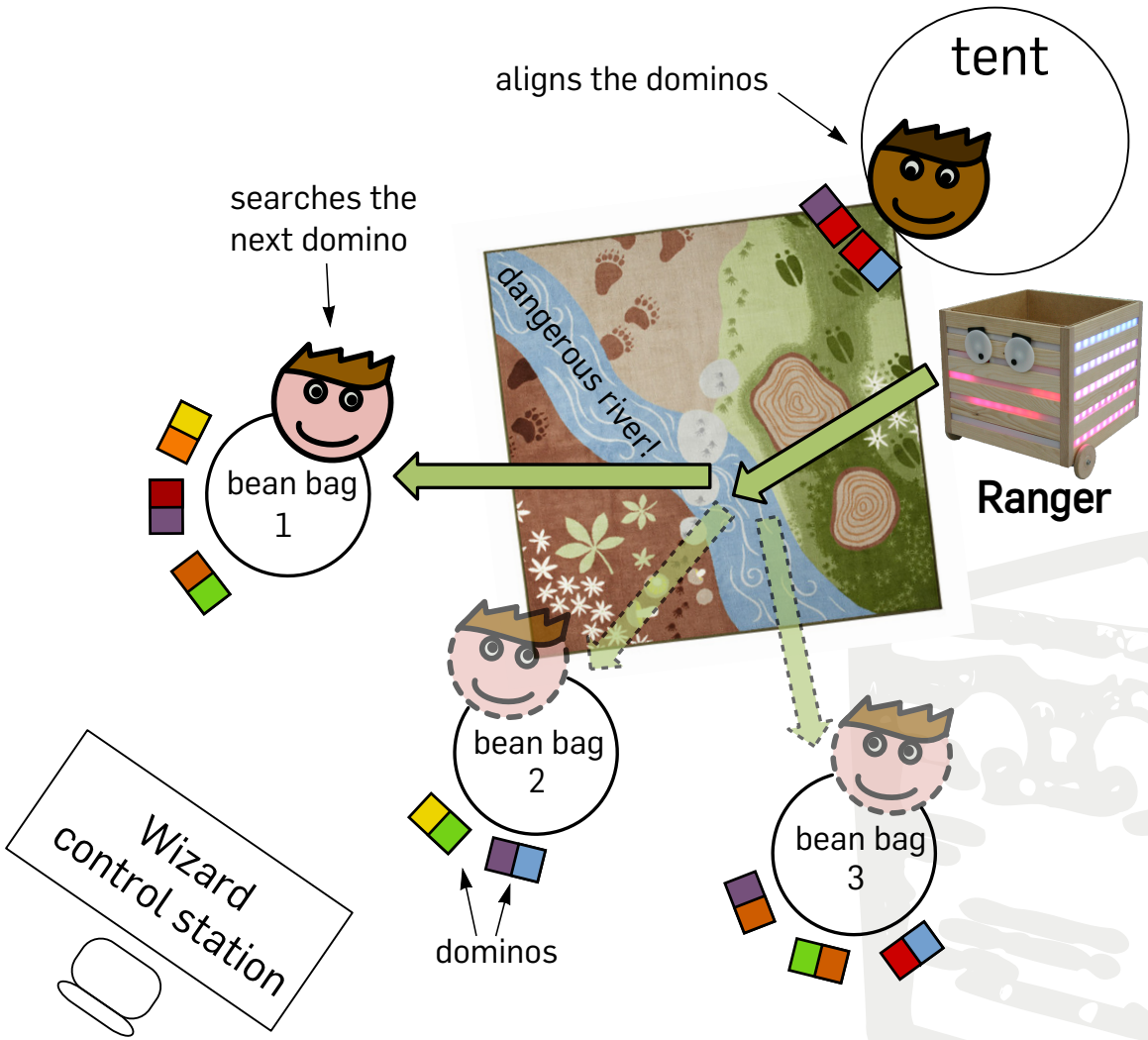
THE DOMINOS TASK

One child has to align the dominos, and at each turn, he/she ask for the next one.

But the dominos are hidden in the room: the second child needs to find the requested one, and give it to the robot (which is the only one allowed to cross the dangerous river!)



CORRECT BEHAVIOUR



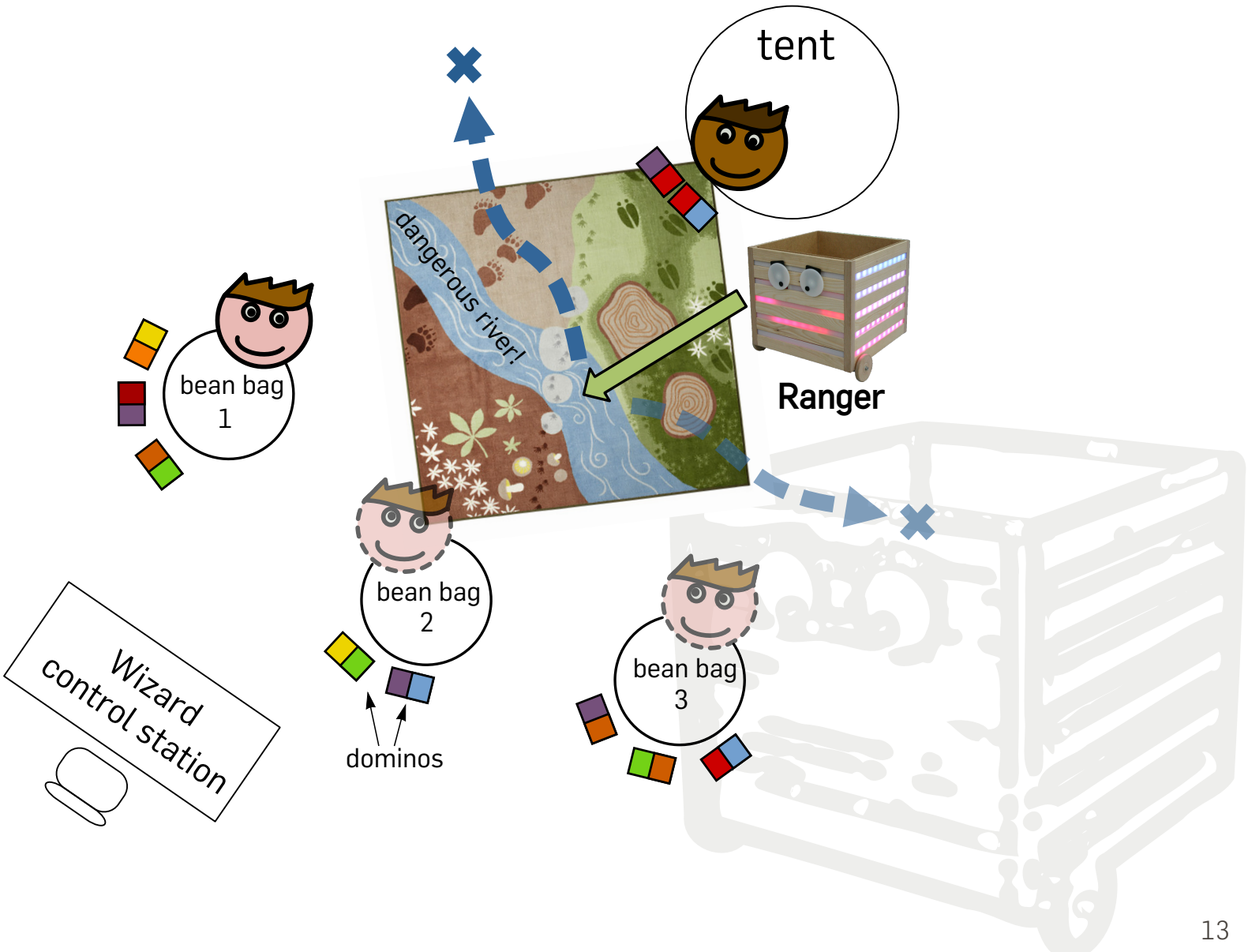
CORRECT BEHAVIOUR

CORRECT BEHAVIOUR

Note the non-verbal interaction cues:

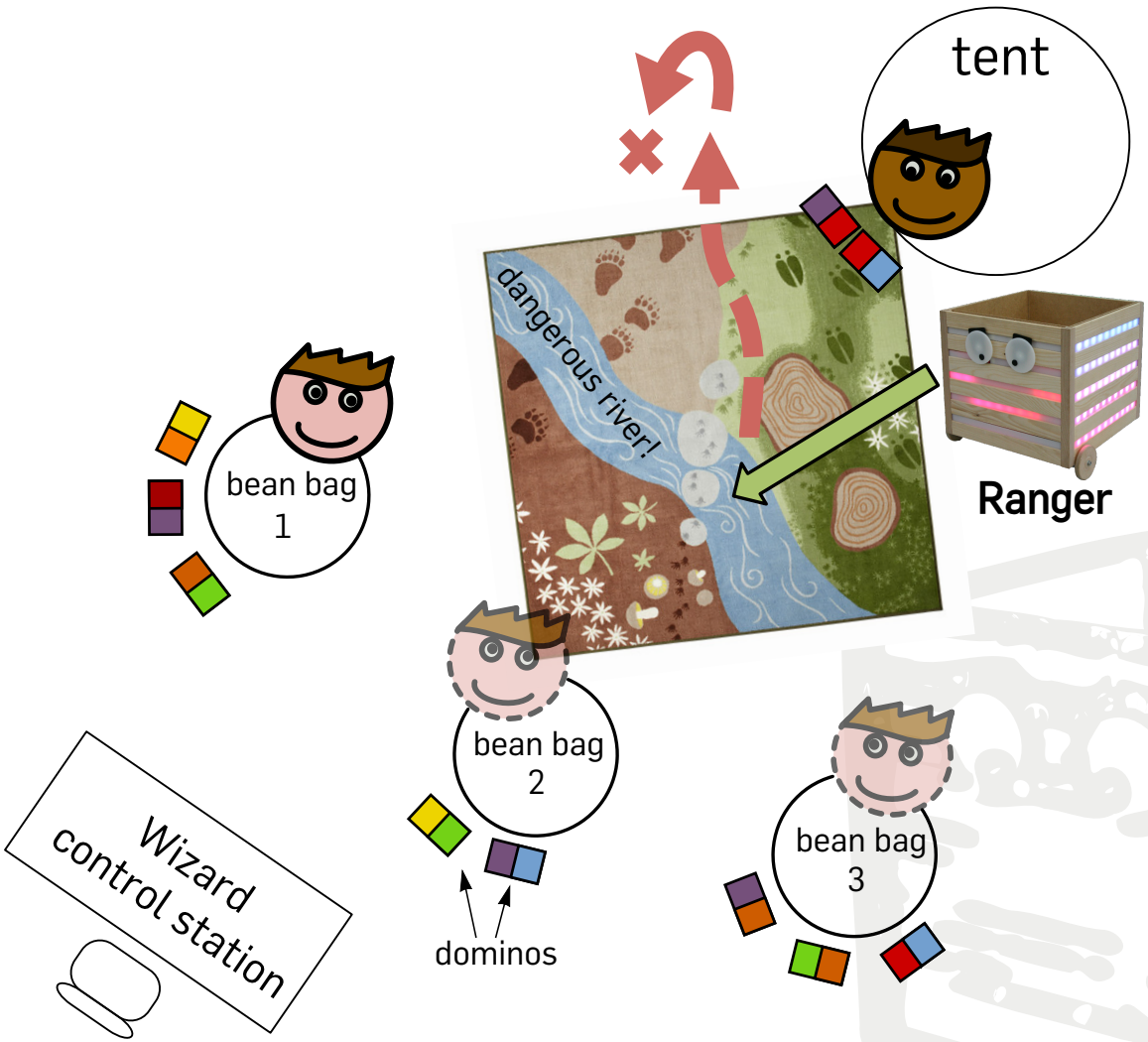
- light patterns (yellow blink: “Give me a domino!”, green pattern: “I got it!”)
- sounds (different sounds for “I got it!” or “Domino removed!”)

LOST BEHAVIOUR

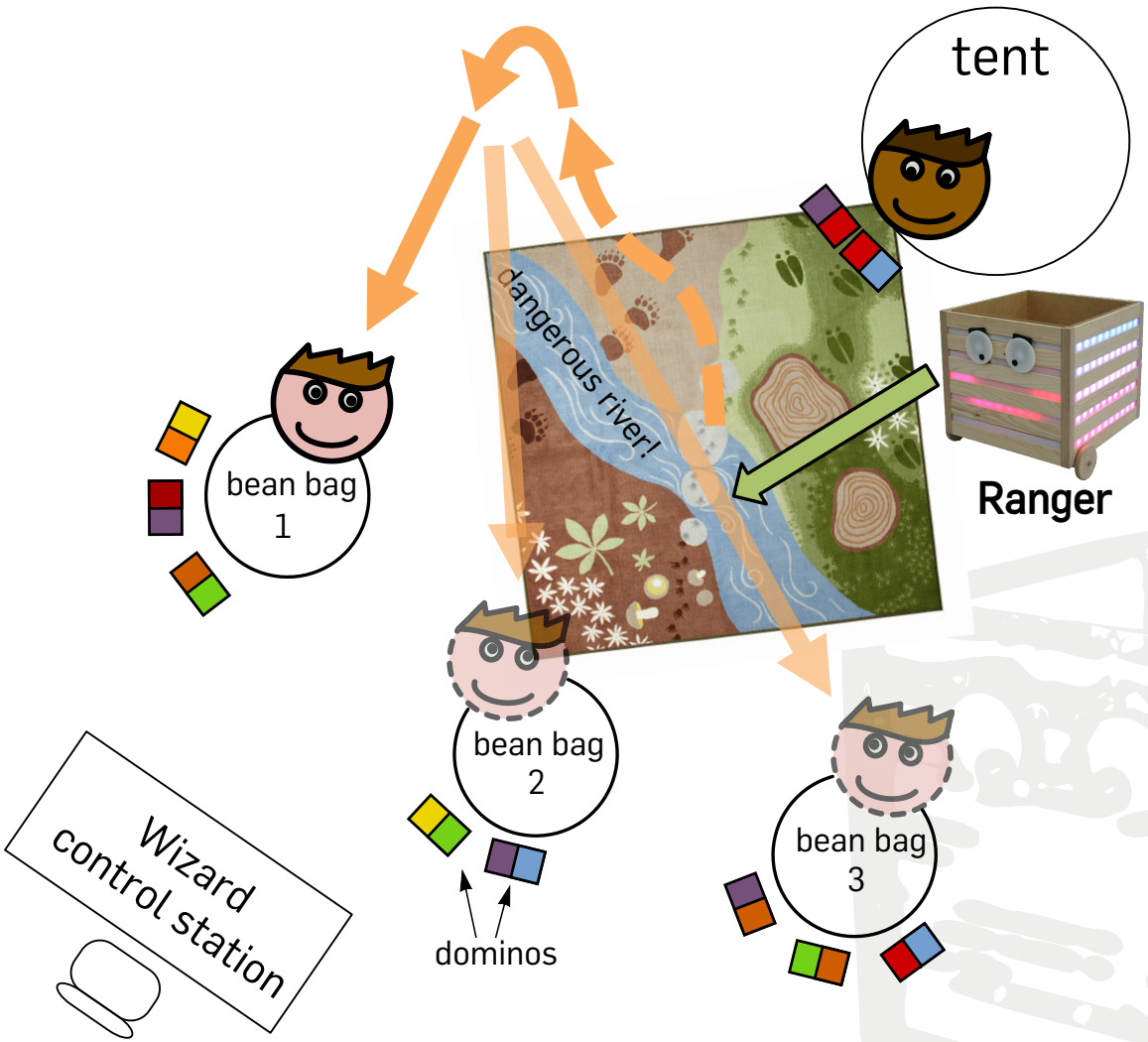


LOST BEHAVIOUR

DISOBEY BEHAVIOUR



MISTAKE BEHAVIOUR



MISTAKE BEHAVIOUR

GENERATING BAD LETTERS

Insight: PCA on a database of hand-written letters to extract characteristic features

GENERATING BAD LETTERS

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LEARNING FROM DEMONSTRATION

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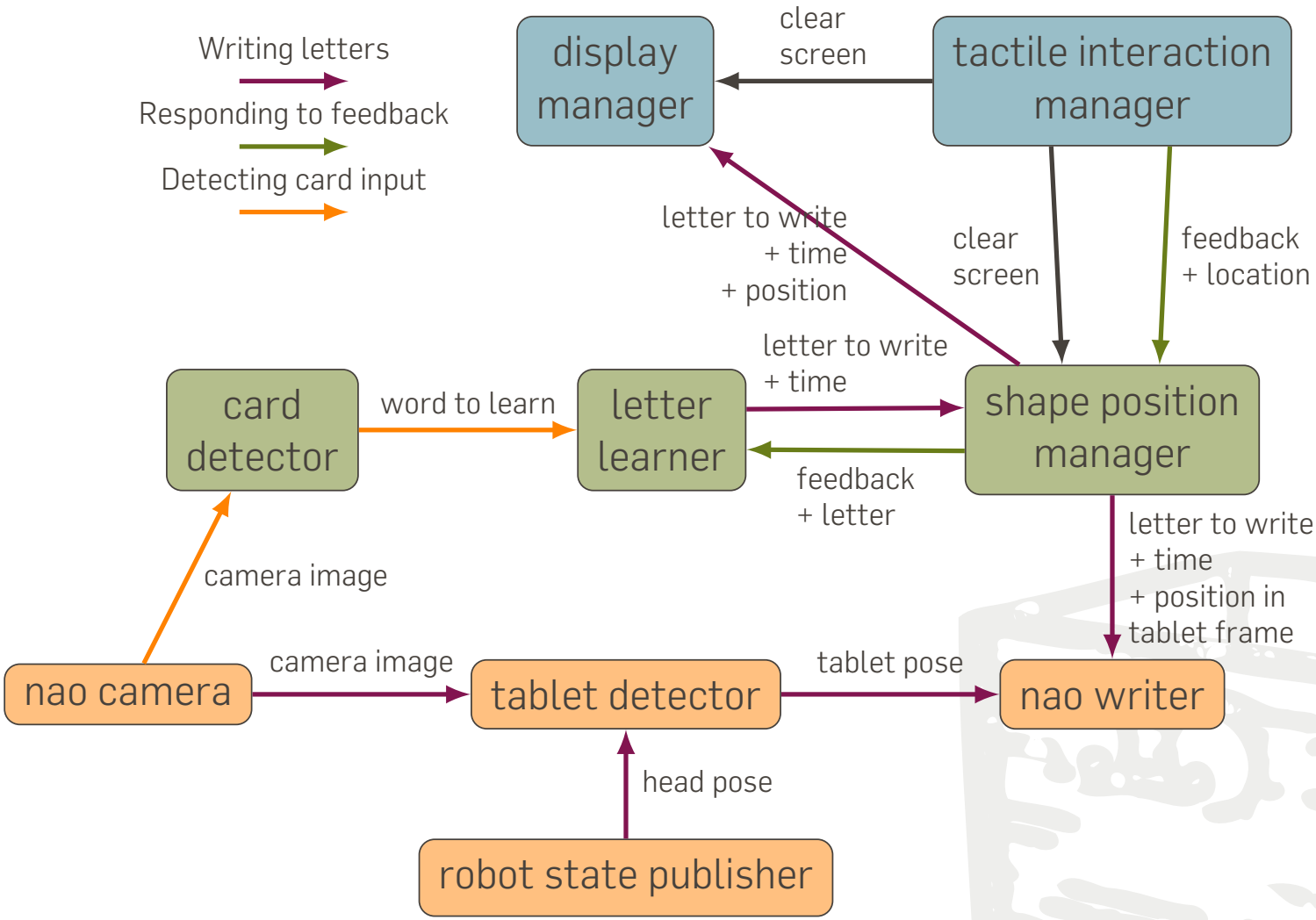
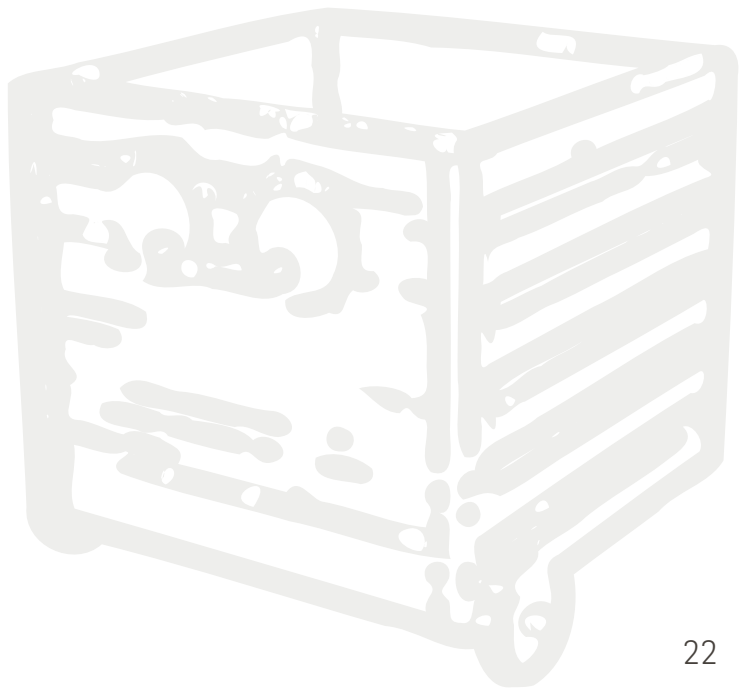

Writing letters
Responding to feedback
Detecting card input
display manager
clear screen
tactile interaction manager
letter to write + time + position
clear screen
feedback + location
letter to write + time
card detector
word to learn
letter learner
shape position manager
feedback + letter
letter to write + time + position in tablet frame
camera image
nao camera
camera image
tablet detector
tablet pose
nao writer
head pose
robot state publisher

ON THE FIELD

A NEW ROLE?

A NEW ROLE?

- Not a 'tool to teach robotics', not a facilitator



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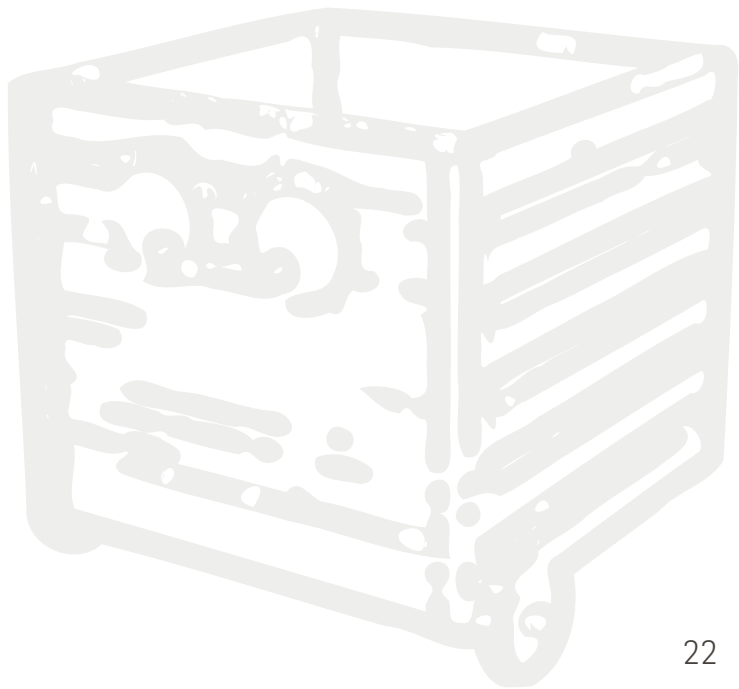
- The robot as 'cognitive agent' is key here (Protégé effect, metacognition)



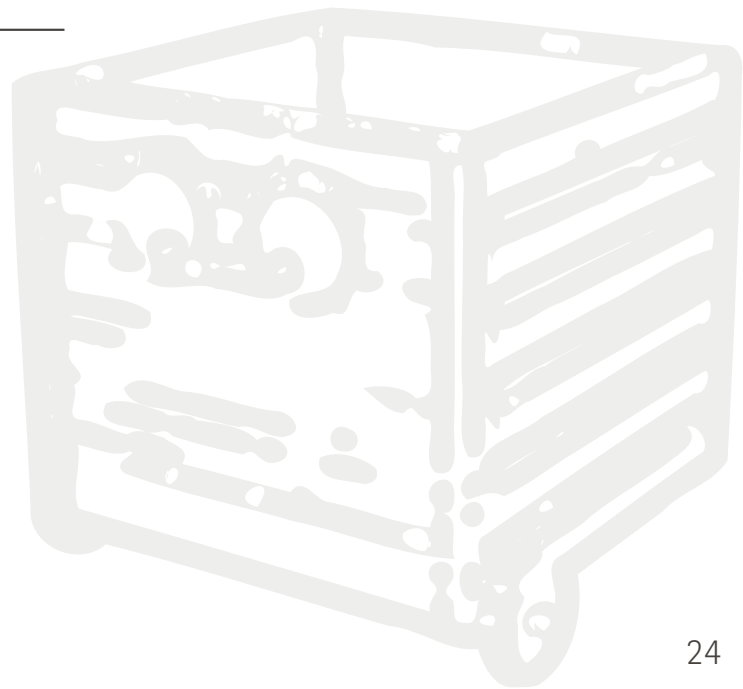
A NEW ROLE?

- Not a 'tool to teach robotics', not a facilitator
- The robot as 'cognitive agent' is key here (Protégé effect, metacognition)
- Could we replace it by someone else? Not easily

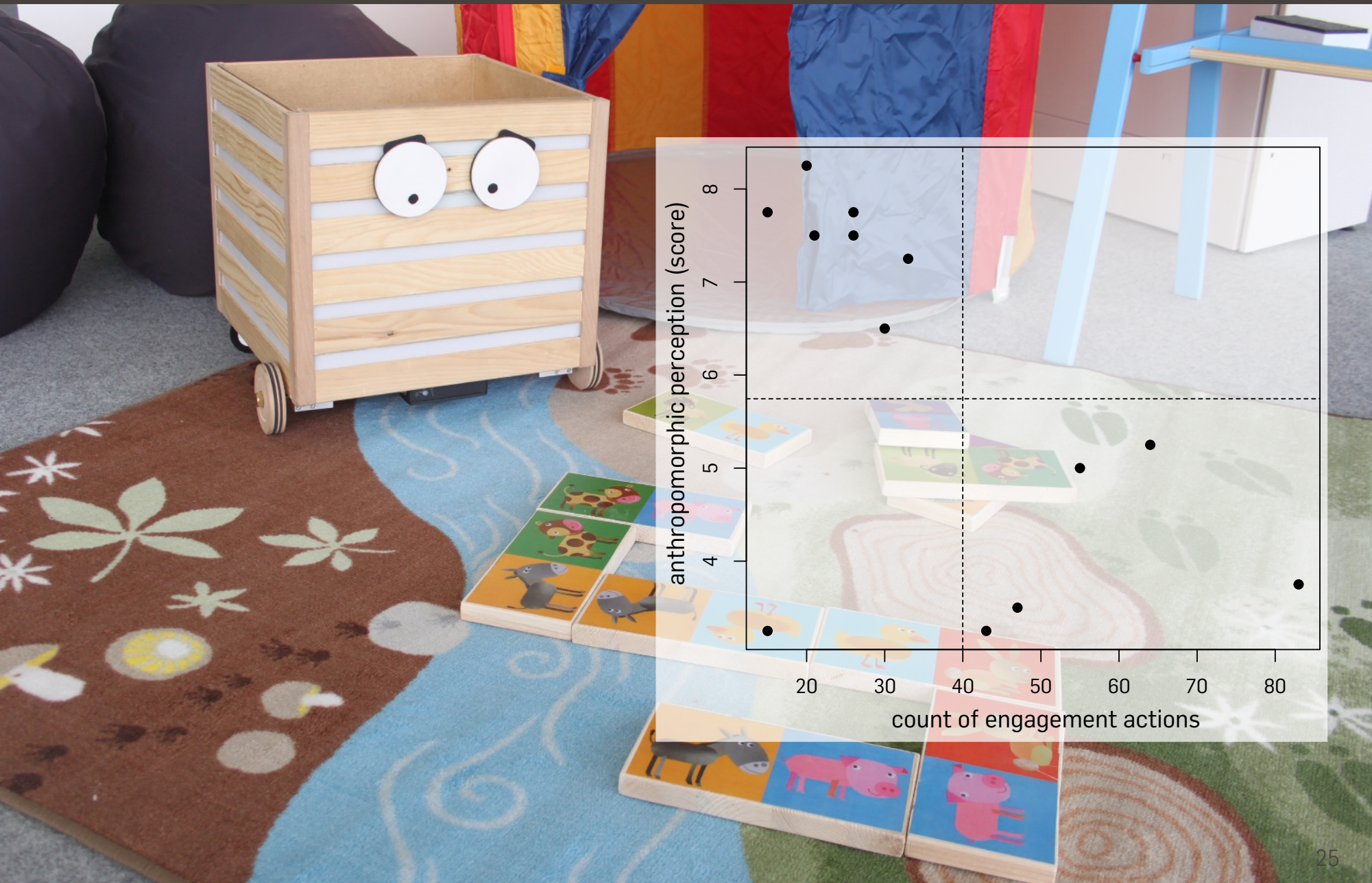
TAKE HOME MESSAGE?

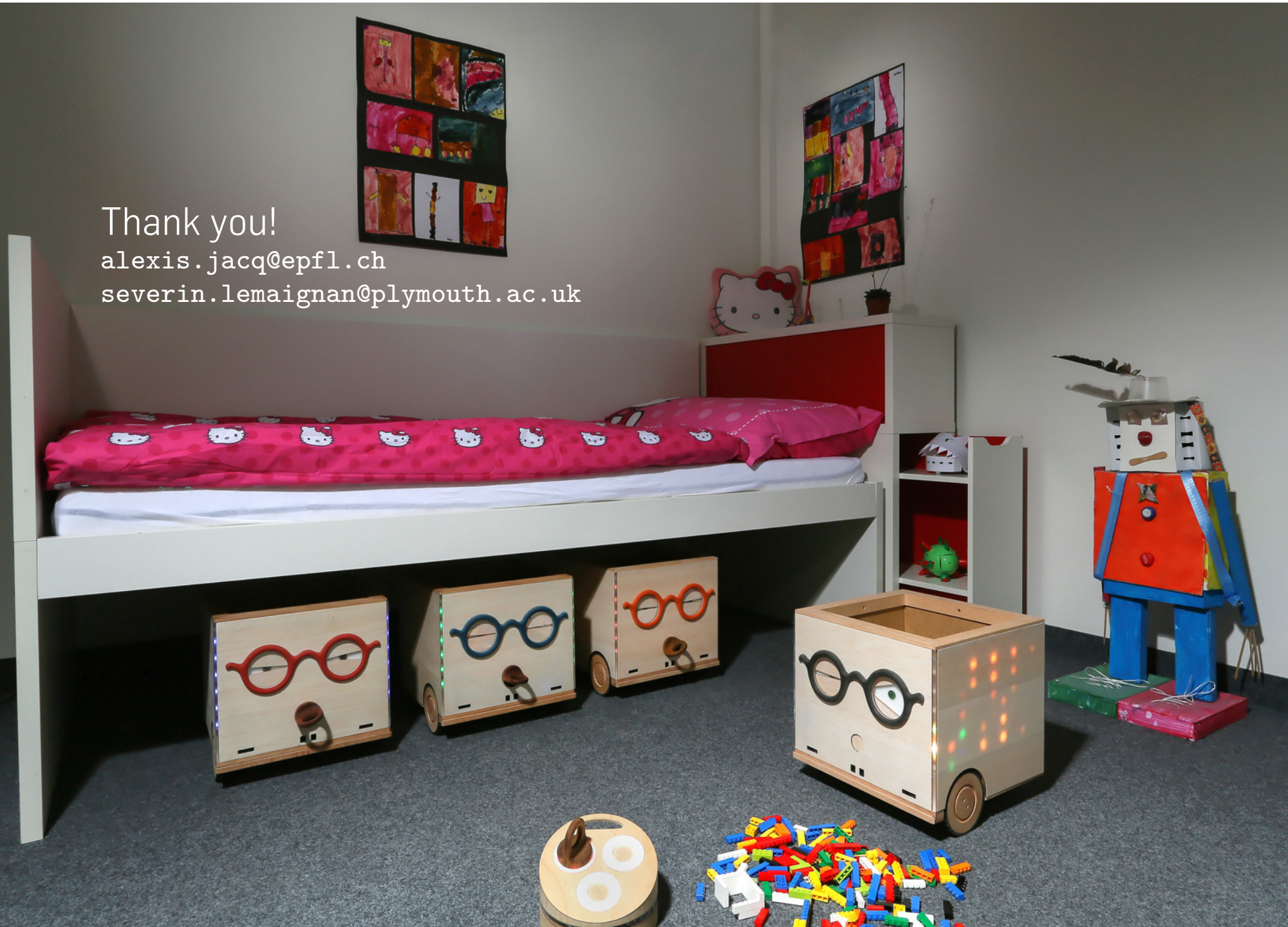
UNEXPECTED BEHAVIOURS

	Unplanned by the robot	Planned by the robot
Perceived as non-intentional	A	B
Perceived as intentional	C	D



ANTHROPOMORPHISM != ENGAGEMENT




Thank you!
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