Impact of Background Context on Autistic Children's Recognition of Robot Emotions

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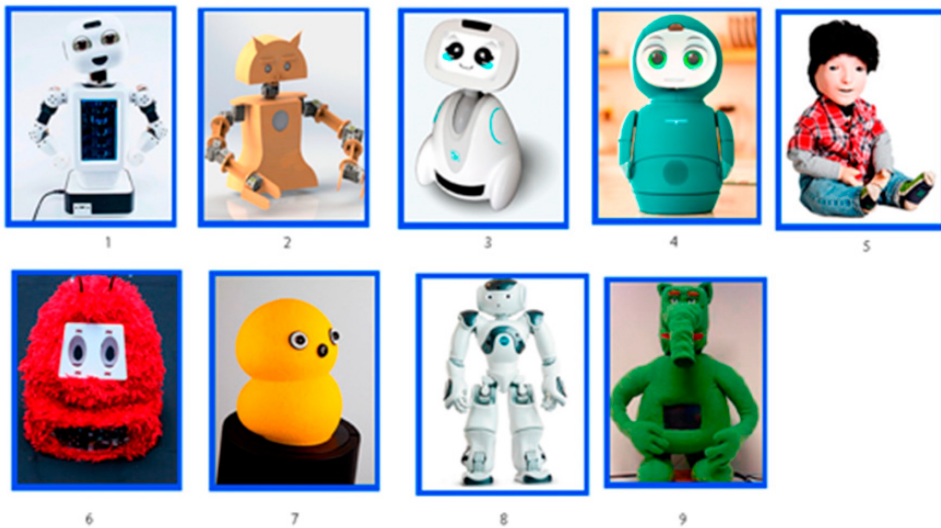
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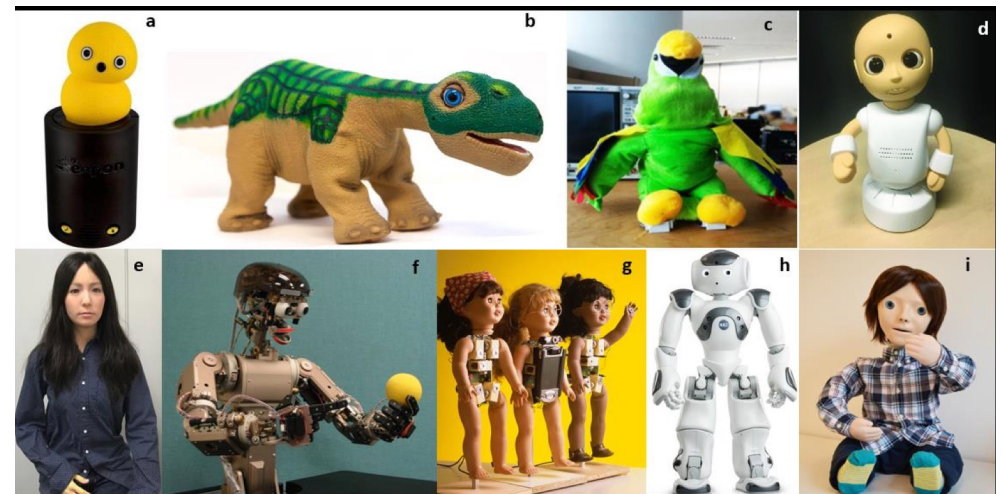
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The physical appearance of robots is crucial for children with and without Autism Spectrum Disorder (ASD) …
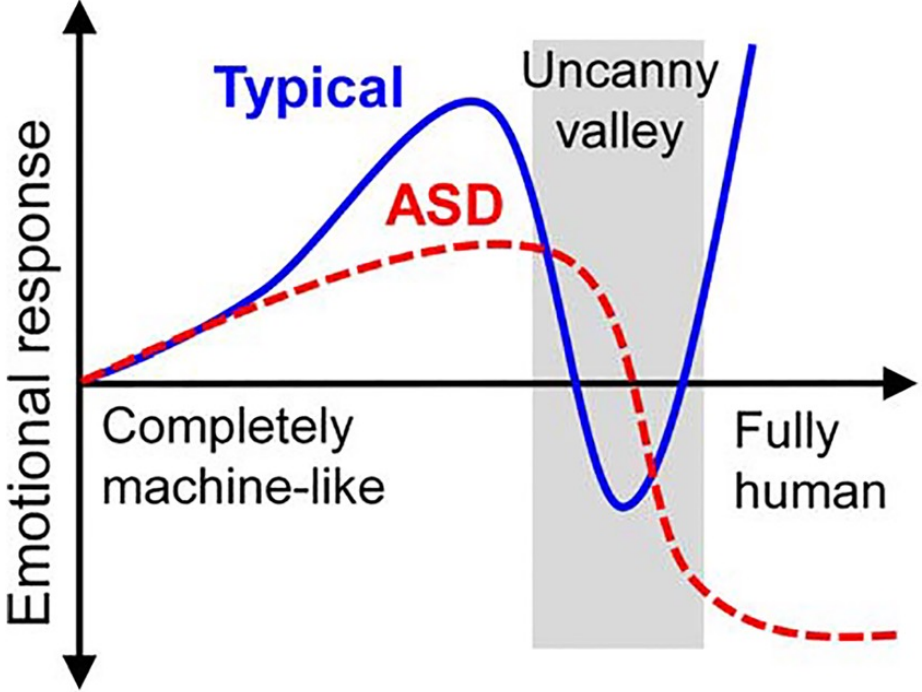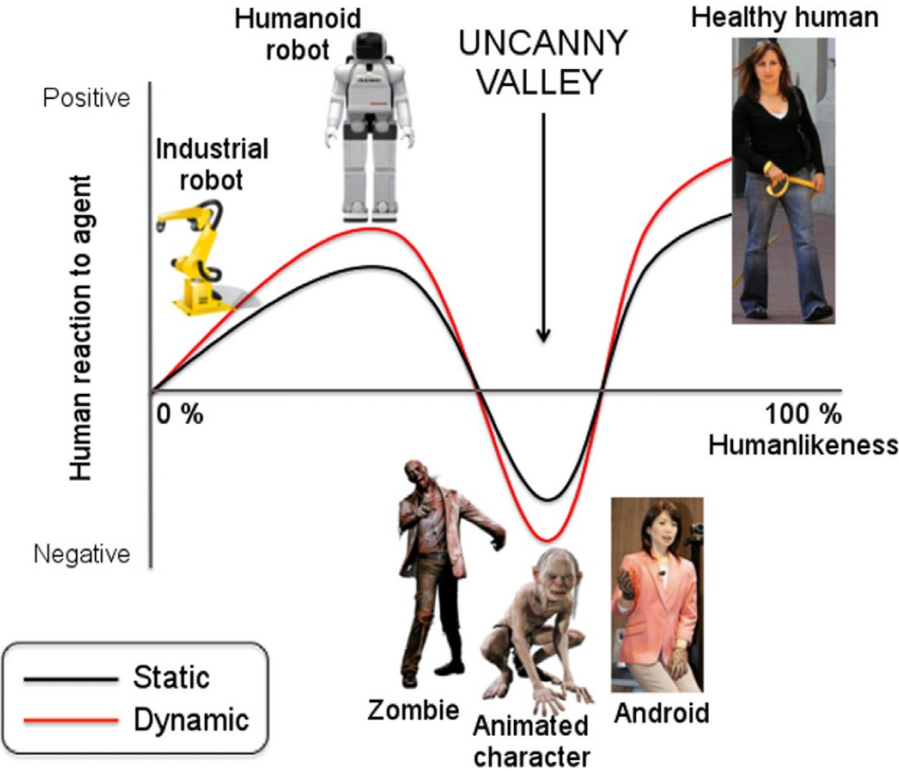

Robins *et al.*, 2004, 2005, 2006

Kumazaki *et al.*, 2020, 2025

… because the « Uncanny Valley » effect according to the presence if ASD

Ueyama, 2015

But the background (*i.e.*, the field) is never included in the studies !...

➔ « *Field Dependence–Independence (FDI) is a widely studied dimension of cognitive styles designed to measure an individual's ability to identify embedded parts of an organized visual field as entities separate from that given field* »

(Farmaki *et al*., 2019)

"My Wife and My Mother-in-Law"
The young woman appears with her face turned away from the viewer while the old woman appears in profile, so the part of the drawing that represents the young woman's ear is the old woman's eye

Our question ➔ What is the impact of different backgrounds on children's ability to recognize emotions in robots with ASD?

Participants :

➢ **9 children with autism** ("ASD" group; ; 7 boys and 2 girls; mean age = 9.4 years-old, SD = 0.8 months)

➢ **6 children without autism** ("No ASD" group; 5 boys and 1 girl; mean age = 9.3 years-old, SD = 0.7 months)

➢ Asssessment of ASD ➔ French translation of the second version of the Childhood Autism Rating (CARS-2)
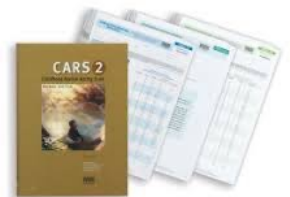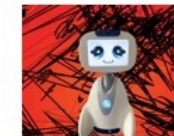
Independent factors :

1. **Group of children** (between-subject), with two modalities: "ASD" vs. "No ASD";

2. **Background of pictures** (within-subject), with four modalities: "No background", "Anger", "Happiness" and "Sadness";

3. **Robot** (within-subject), with three modalities: Nao, Leka and Buddy.

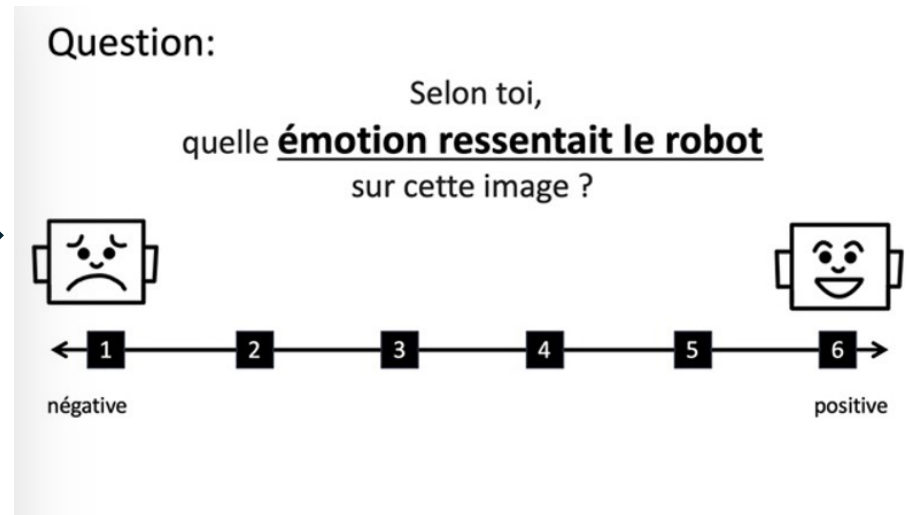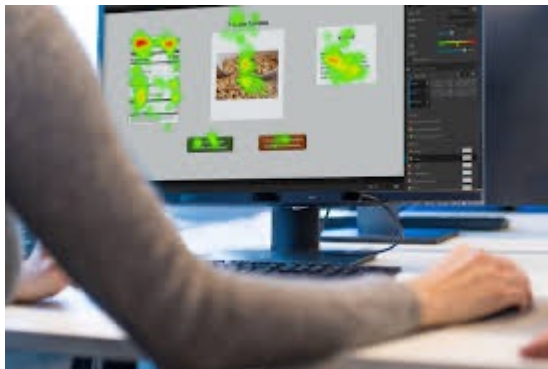**ROBOTS**

Buddy   Nao   Leka

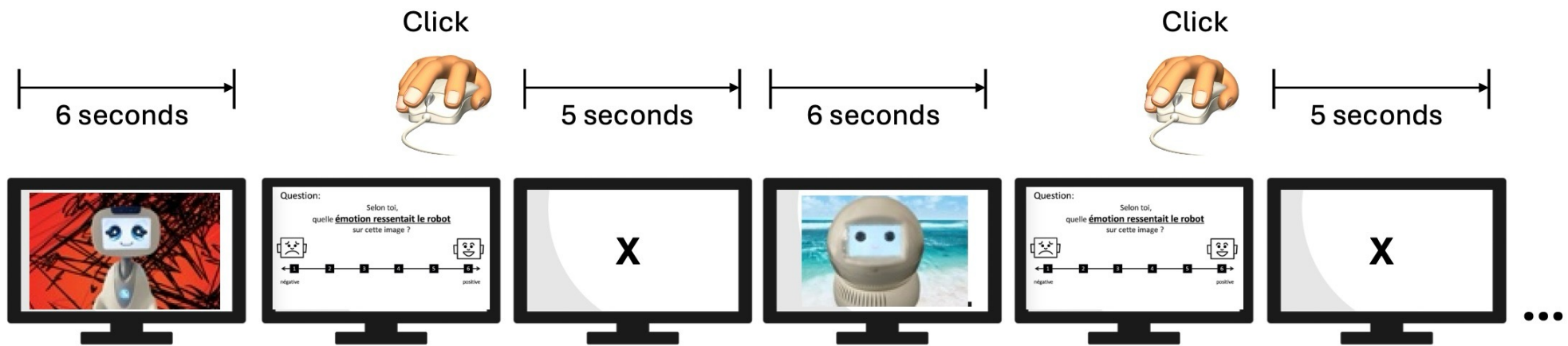**BACKGROUNDS**

Anger

Happiness

Sadness

Dependent factors (measures) :

1. Emotion recognition, assessed by responses given to a Likert-scale, from 1 ("Negative emotion") to 6 ("Positive emotion");

2. Eye-gaze exploration (Tobii Pro Spark, sampling frequency 60 Hz).

Question:

Selon toi,
quelle **émotion ressentait le robot**
sur cette image ?

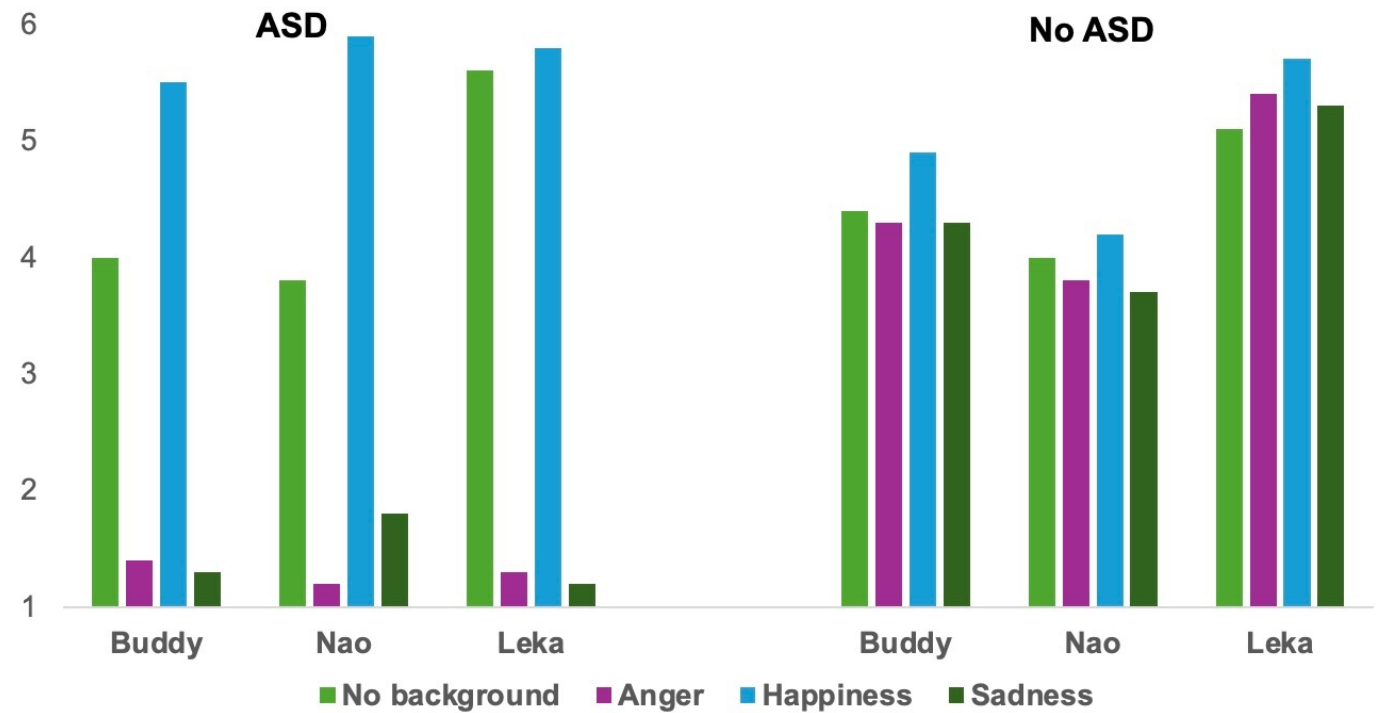négative   1   2   3   4   5   6   positive

Protocol :

Emotion recognition :

1

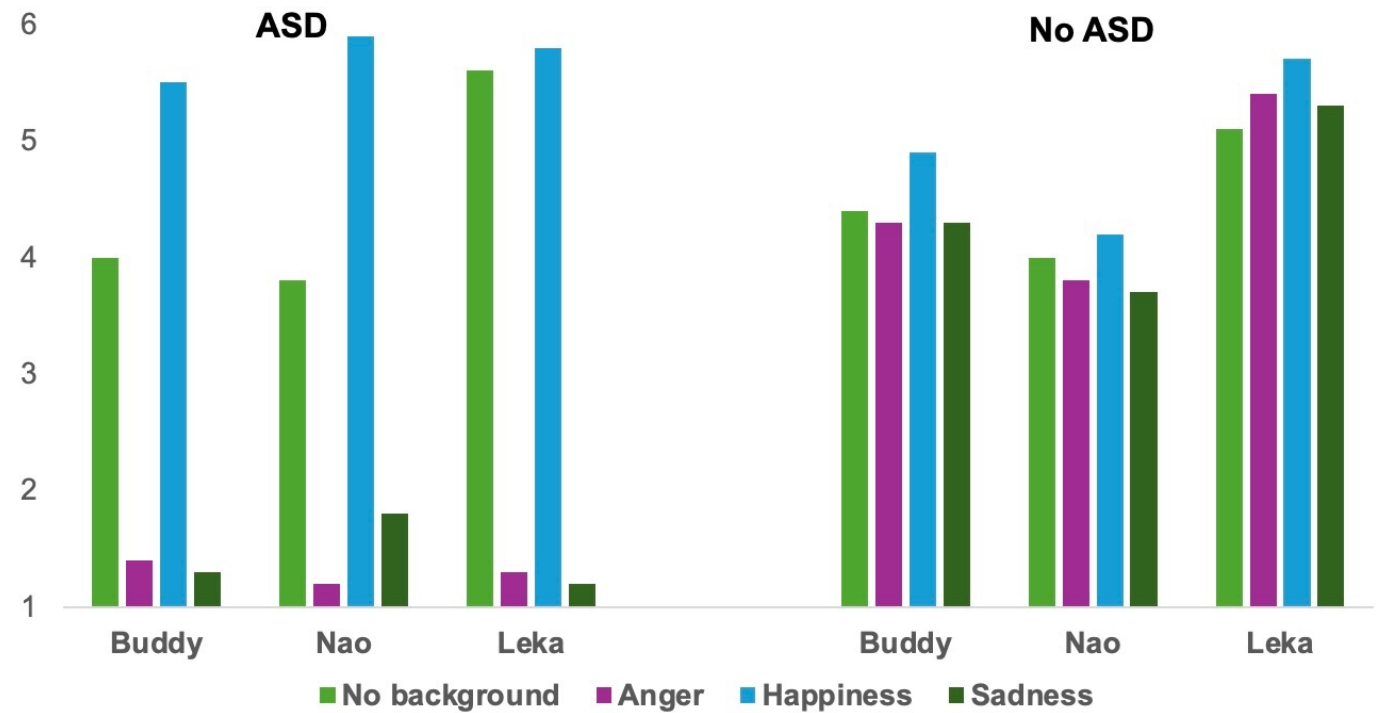1. When no background → patterns of responses given by children with ASD and children without ASD are very similar

Emotion recognition :

1 **2**

1. When no background → patterns of responses given by children with ASD and children without ASD are very similar
2. For children without ASD ("No ASD" group) → no impact of background on emotions perceived

Emotion recognition :

1 **2** **3**

1. When no background → patterns of responses given by children with ASD and children without ASD are very similar
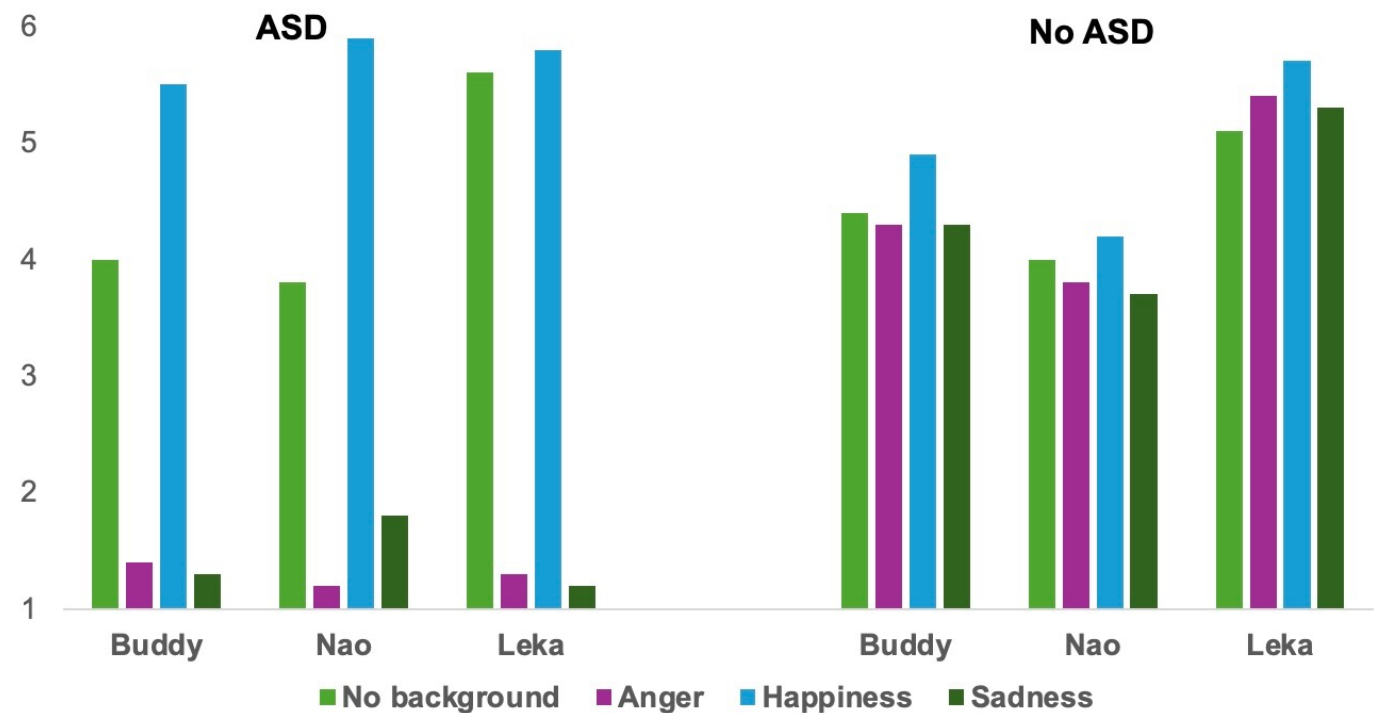2. For children without ASD ("No ASD" group) → no impact of background on emotions perceived
3. For children with ASD ("ASD" group), there is a significant impact of background on responses given
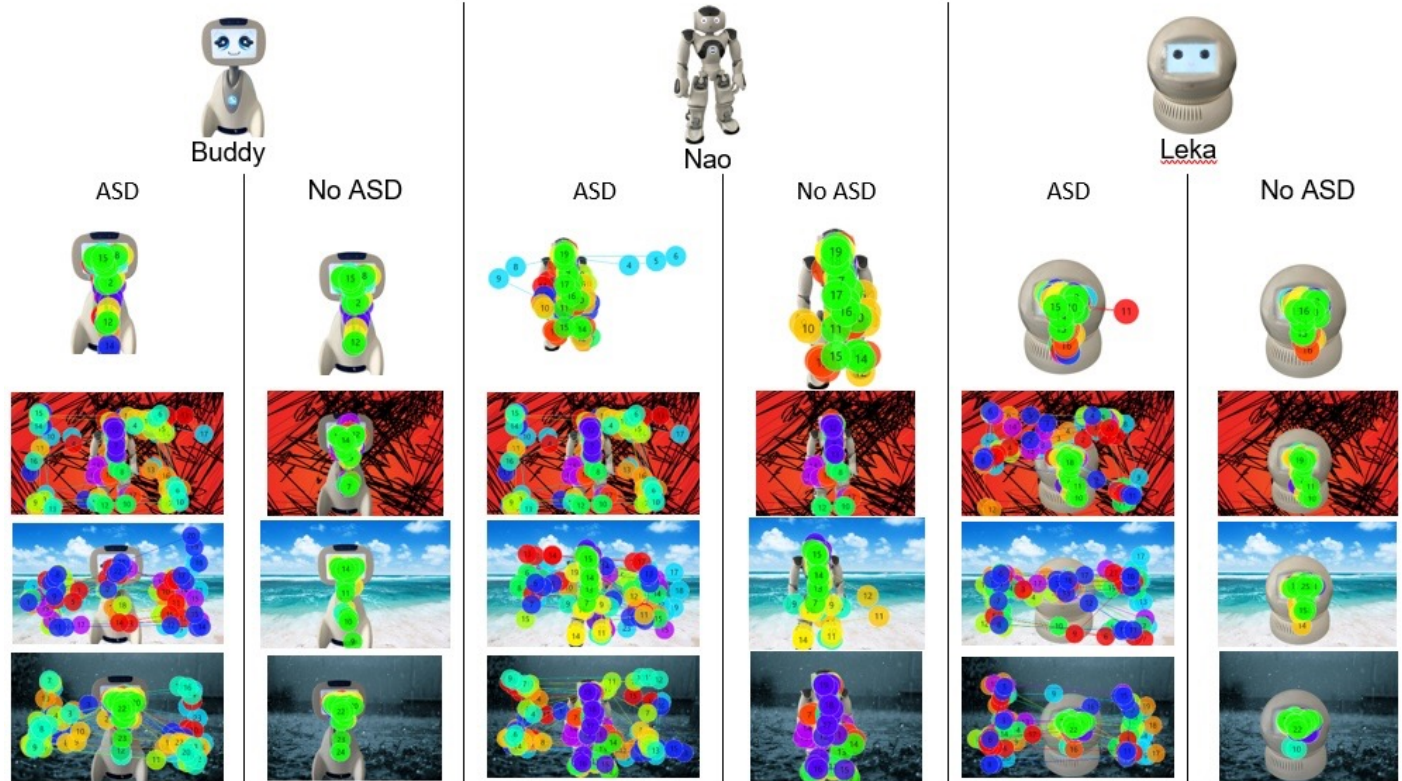
Eye-gaze exploration :

When no background ➔ visual exploration of children with autism ("ASD" group) and children without autism ("No ASD" group) is very similar

Eye-gaze exploration is always concentrated on the face of the robot, whatever the group (ASD vs. No ASD)
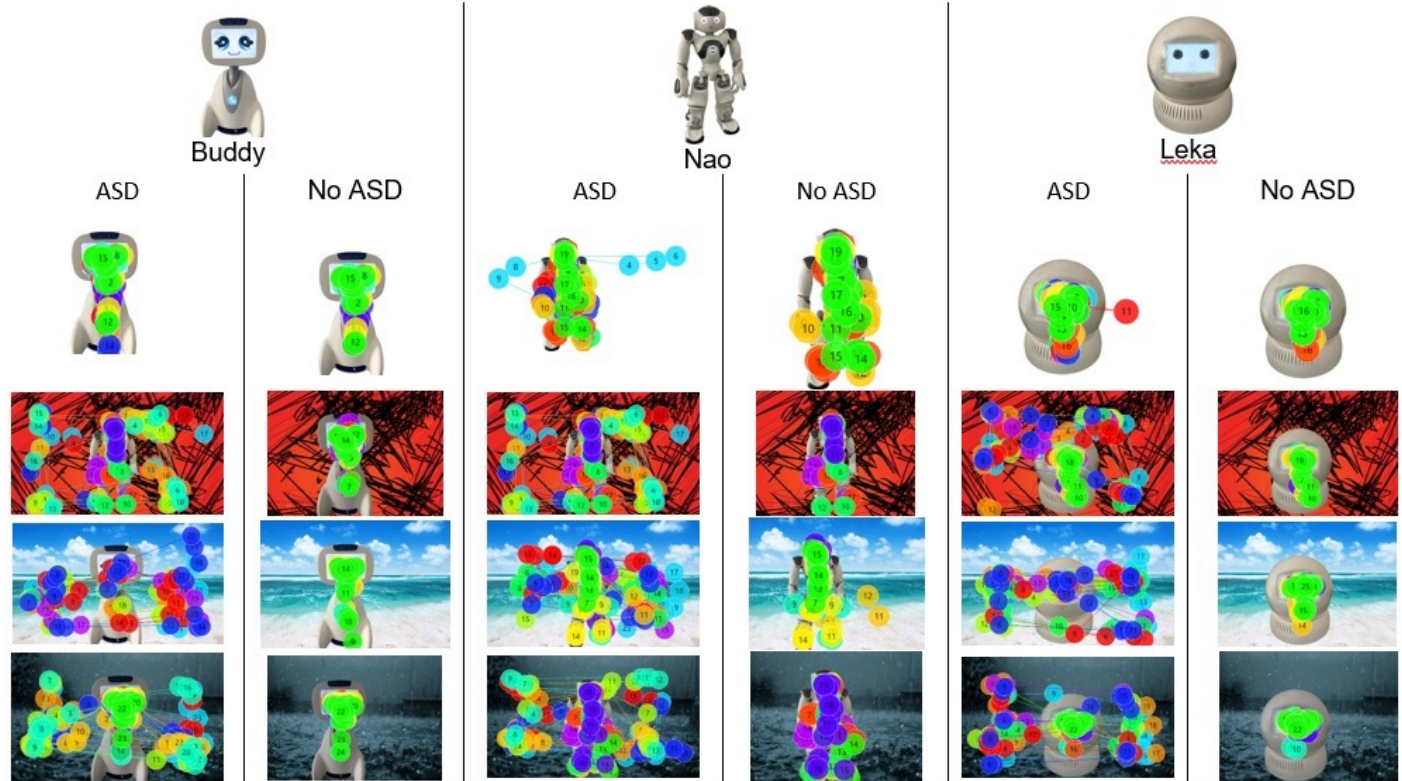
Eye-gaze exploration :

1 **2** **3**

For children without autism ("No ASD" group):

- ✓ there is no impact of the background on their visual exploration
- ✓ Gaze exploration is always concentrated on the face of the robot whatever the robot and whatever the background.
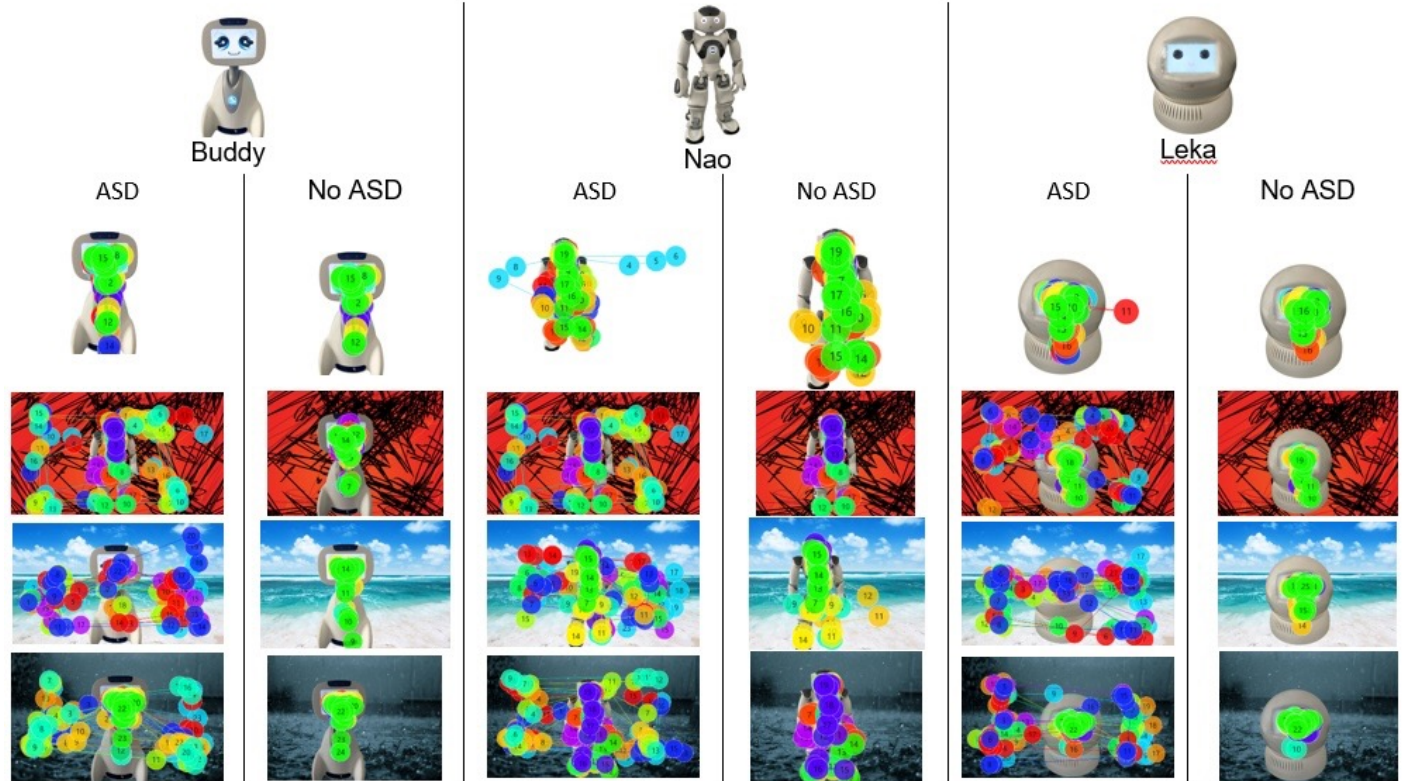- ✓ Only 8% of visual exploration time was spent on the background around the robots

Eye-gaze exploration :

For children with autism ("ASD" group):
- ✓ Eye-gaze exploration is widely distributed around the robot
- ✓ More than 70% of visual exploration time was spent on the background around the robots, whatever the background.

Thank you for your attention ...

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