

# Robot in the loop of therapeutic care for children with autism



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# Robot in the therapeutic care for autism

1

Keepon



2

Lab test



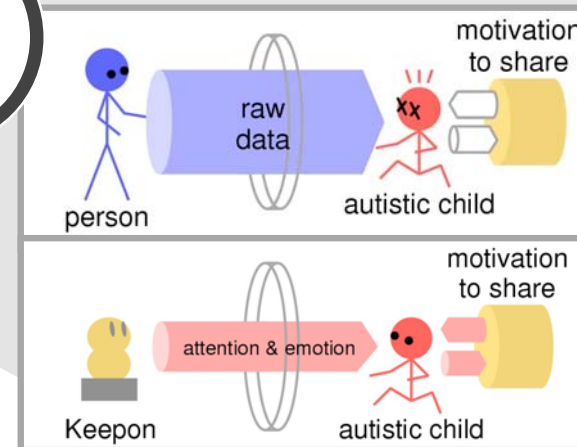
3

Field practice



4

Implications



## The robot!

1

Keepon  
nature-like robot



Something between  
a **toy** and a **living-thing**



12cm tall;  $\varnothing$ 8cm

Silicone rubber



## Child-robot interaction in the *lab*



Children changed *meaning* of and *stance* to Keepon with their developmental stages

moving  
**things**



0  
yo

reactive  
**systems**



1  
yo

proactive  
**agents**



2  
yo



## Observing children in the *field*

3

observe children's *daily* social practice with adults and peers.

Children with  
**Autistic Spectrum Disorders**

Therapeutic & daily activities  
at a **day-care center**

**Longitudinal observations**  
of a group of children with ASD

- at 2~4 years of age
- interacting with  
parents/therapists  
*and*  
**Keepon (robot)**  
as one of the toys

Playroom at the day-care center



# Keepon in the playroom



Ceiling camera



Wireless Keepon

*Omihachiman-City Day-Care Center for Children with Special Needs.*

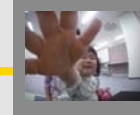
Therapeutic activities **in groups**  
(8 children + 8 parents + 8 therapists)

Observation: 3h x 2~4 times/month since October 2003 (still on-going)  
→ **120+ sessions**, 35+ children

No instruction to children or adults.



Operator (Wizard)



PC



## Case study



Please refrain from photographing here.

### Subject P (girl)

#### Observation

15 sessions

CA = 3:9 to 4:1

(No apparent lang.)

0:4, 0:10 No remark in inspections

1:6 “Keep watching” in inspection

1:11 Consultation → DA (dev.age) = 0:10

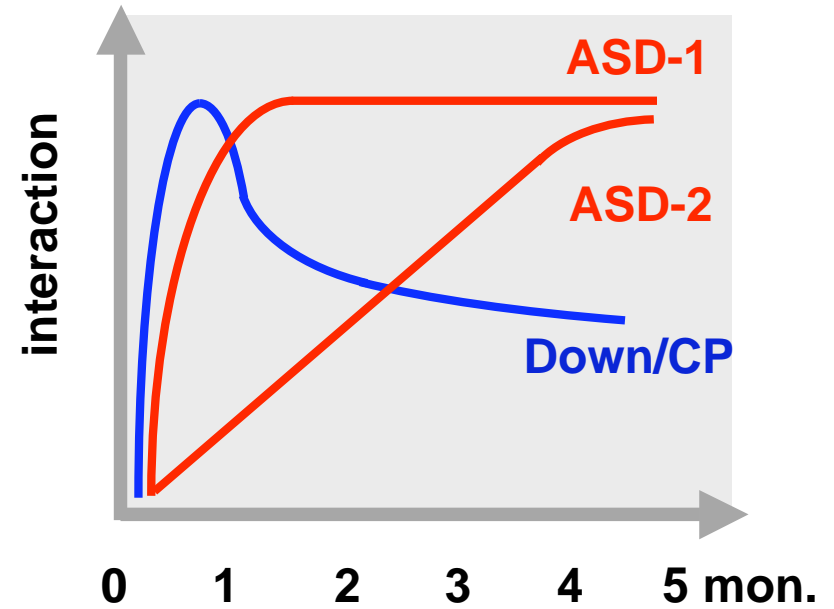
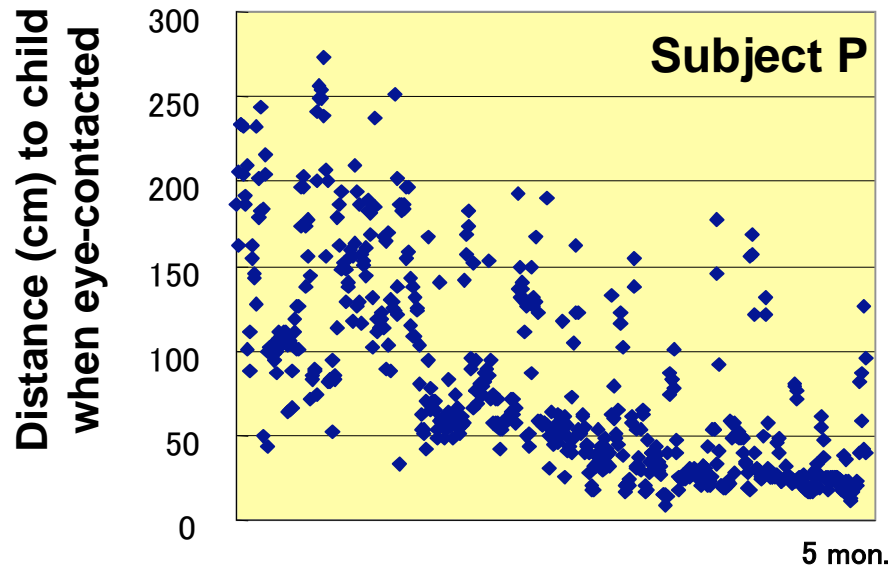
2:2 Start therapeutic service (day-care)

3:5 Diagnosed as **AUT with moderate-MR**

4:2 Kindergarten (with a special teacher)

5:0 Inspection → Cog 2:6, Lang 1:0

## Case study

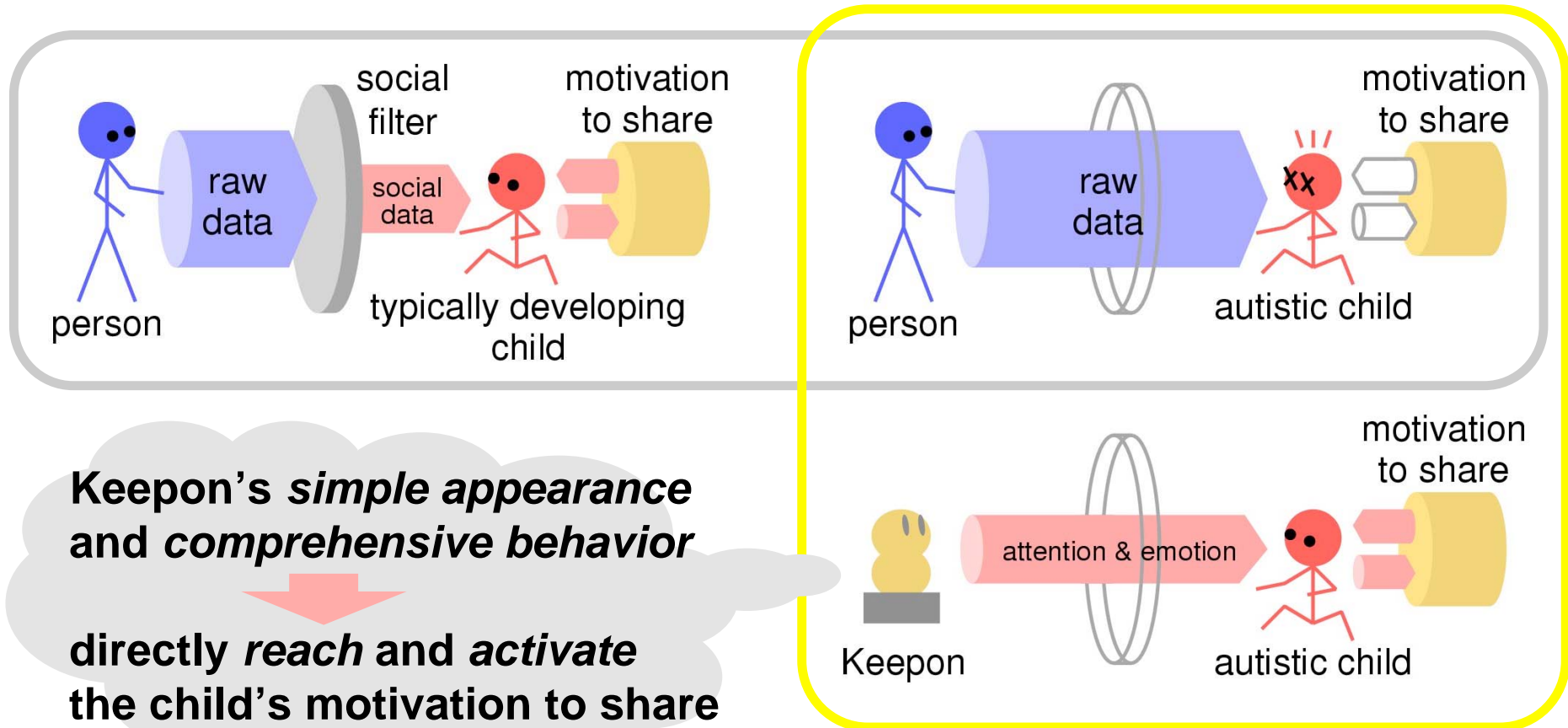


Why autists enjoyed social interaction?



# Why autists enjoyed social interaction

“Autists lack motivation to share mental states” (Tomasello)  
Autists are overwhelmed by “information flood” from person



## Case study



Please refrain from photographing here.

### Subject N (girl)

#### Observation

38 sessions

CA = 3:4 to 4:8

(No apparent lang.)

0:10, 1:6 Inspection → “Keep watching”

2:0 Consultation → Phy 1:0, Cog 1:0-1:5

2:9 Start therapeutic service (day-care)

3:1 DA = 1:7 (Phy 1:8, Cog 1:9, Lang 0:8)

4:0 Phy 3:1, Cog 2:7; comprehensive vocab.

4:9 Kindergarten (with a special teacher)

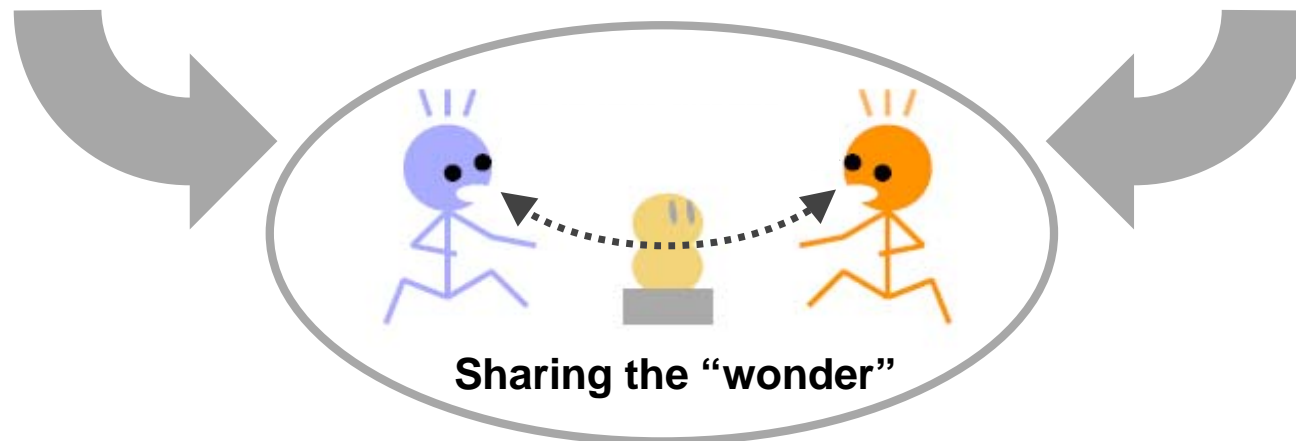
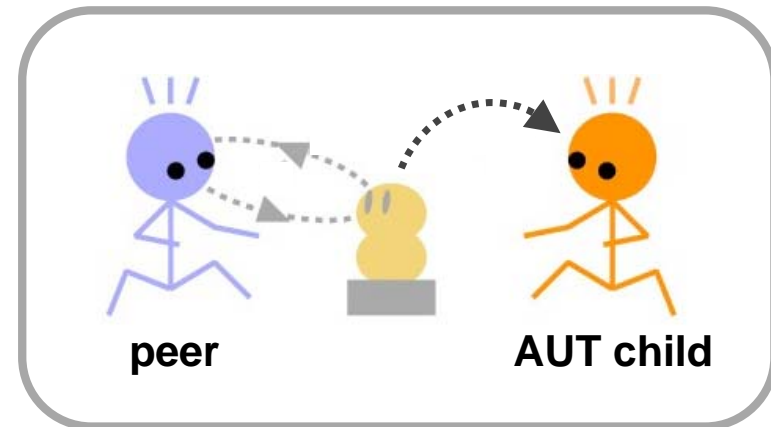
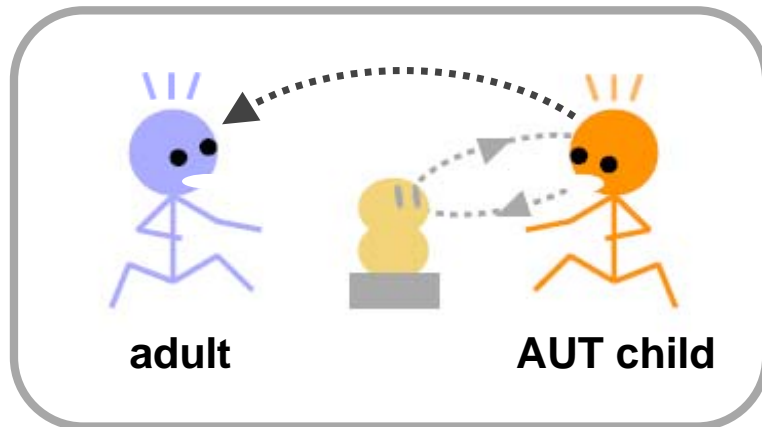
(No medical diagnosis, but certainly **AUT**)

## Robot as a mediator

### Keepon functions as a pivot (topic) of interaction

- Exploration for “wonder”
- Adults’ empathetic response

- Observing other’s action
- Sharing “wonder” of Keepon

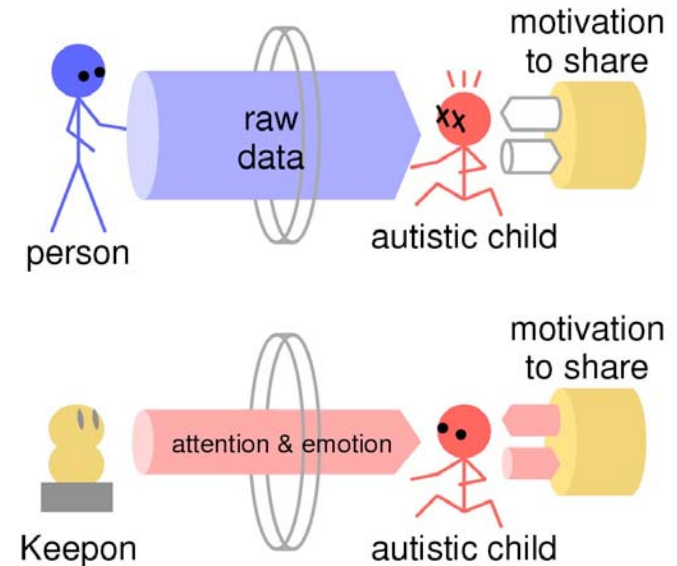


# Conclusion: Robot as a new tool for autism therapy

## Beauty of “minimal design”

Simple robots, like Keepon, would directly convey **social meaning** without making “information flood”

And hopefully this gives the child experience of the social interaction.



## Participating observation

Record and analyze the interaction from the **perspective** of the robot as the first person of the interaction.

Anyone (parents, therapists, researchers) can re-experience and share.

