Robot in the loop of therapeutic care for children with autism

Hideki Kozima (NICT)
Yuriko Yasuda (Omihachiman City)
Cocoro Nakagawa (NICT)
Robot in the therapeutic care for autism

1. Keepon

2. Lab test

3. Field practice

4. Implications
The robot!

1. Keepon

A creature-like robot

- Something between a toy and a living-thing
- 12 cm tall; Ø 8 cm
- Silicone rubber

Attentive expression
Emotive expression
Child-robot interaction in the lab

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

0 yo
1 yo
2 yo

moving things
reactive systems
proactive agents
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* Keppon (robot) as one of the toys

Playroom at the day-care center
Omithachiman-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.
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
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

Keepon’s *simple appearance* and *comprehensive behavior* directly *reach* and *activate* the child’s motivation to share
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

Sharing the “wonder”
Conclusion: Robot as a new tool for autism therapy

Beauty of “minimal design”

Simple robots, like Keepon, would directly conveys 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.