

Wowing together: What facilitates social interactions in children with autistic spectrum disorders

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Introduction

We report our remedial model “wowing together” for the emergence of triadic interpersonal interaction in children with autistic spectrum disorders, which came out of our longitudinal observation of child-robot interaction in their playroom at a day-care center for children with developmental disorders.

Keepon in the playroom

We observed totally 30+ children with developmental disorders, such as autistic spectrum disorders and Down syndrome, who interacted with a simple creature-like robot, *Keepon* (Fig. 1), together with their therapists and caregivers. *Keepon* was placed in their playroom just as one of their toys (Fig. 2), and tele-controlled by a human operator in a remote room. Because of *Keepon*'s comprehensive appearance and relatively predictable responses gave the children a playful and relaxed mood, in which they spontaneously engaged in dyadic interaction with *Keepon* and sometimes in triadic one, where *Keepon* worked as the pivot of interpersonal play with their carers.

Wowing together

Looking into the cases where the children first made referential looking to their carers, which would be the precursor to triadic social interaction, we found the following prototypical course of events (Fig. 3).

1. A child explores the response patterns of *Keepon*, and found an interesting one. (E.g. the child pokes *Keepon*'s nose, then the robot bobs its body up and down in response to the poking stimulus.)
2. The child experiences emotional move, and at the same time, the carers show emotional responses based on empathetical understanding of what happened to the child. (E.g. the child gets surprised and pleased at *Keepon*'s response, and the carers burst into laughter.)

Then referential looking emerged, as if the child was checking and/or inducing the same emotional envelop with the carers. We regard this course of events not only as the emergence of social interaction but also as the discovery of another person who

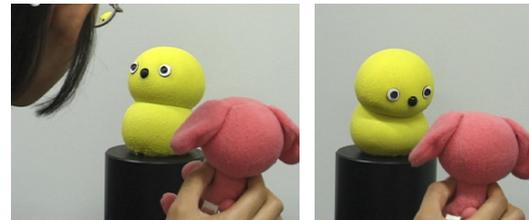


Fig. 1. *Keepon*, the socially interactive robot.



Fig. 2. *Keepon* in the playroom.

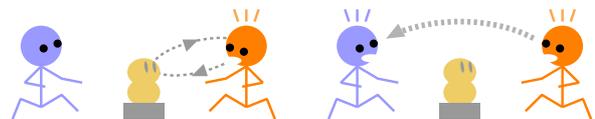


Fig. 3. Wowing (left) and sharing (right).

could share with the child the spatio-temporal envelop of emotion.

Implication for epigenetic robotics

The phases in “wowing together” above reflect the following two fundamental (and probably intrinsic) motivations for open-ended social development.

1. *Curiosity*: motivation for seeking novelty or learning progress in the interaction with the environment, by which the child explore “wow” in the dyadic interaction with the robot.
2. *Sharing*: motivation for sharing the “wow” with others, by which the child checks and/or induces the same emotional envelop in others, especially the caregiver.

We believe that socially developing robot should intrinsically possess above two fundamental motivations for autonomous/open-ended development through the interaction with the empathetic social environment.