Chapter 15

MOBILE ROBOTIC TOYS AND AUTISM
Observations of Interaction

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Abstract
To help children with autism develop social skills, we are investigating the use of mobile robotic toys that can move autonomously in the environment and interact in various manners (vocal messages, music, visual cues, movement, etc.), in a more predictable and less intimidating way. These interactions are designed to build up their self-esteem by reinforcing what they do well. We report tests done with autistic children using different robots, each robot having particular characteristics that allow to create interesting interactions with each child.

1. Introduction

Autism is characterized by abnormalities in the development of social relationships and communication skills, as well as the presence of marked obsessive and repetitive behavior. Despite several decades of research, relatively little is understood about the causes of autism and there is currently no cure for the condition. However education, care and therapeutic approaches can help people with autism maximize their potential, even though impairments in social and communication skills may persist throughout life.

As engineers, we got interested in the idea of designing mobile robotic toys to help children with autism learn to develop appropriate social skills. For an autistic child, a robot may be less intimidating and more predictable than a human. A robot can follow a deterministic play routine and also adapt over time and change the ways it responds to the world, generating more sophisticated interactions and unpredictable situations that can help capture and retain the child’s interest. Robotic toys also have the advantage that they can be programmed to respond differently to situations and events over time. This flexibility allows robotic toys to evolve from simple machines to systems that demonstrate more complex behavior patterns.
The general goal is to create learning situations that stimulate children, get them to socialize and integrate them in a group. People with autism are aware that they have difficulties making sense of the outside world. To help them move from predictable, solitary and repetitive situations where they feel safe to socially interact with the world, the first objective of our robotic toys is to build up their self-esteem by reinforcing what they do good. The idea is to ask the child to do something, and to reward the child if the request is successfully satisfied. To make this work, the activities and the rewards must be something that interests the child, and one of the challenges is to get the attention of the child and get them interested in interacting. Another advantage of robotic toys is that they can have special devices that are particular interesting to these children, trying to find incentives to make them open up to their surroundings. Since each child is a distinct individual with preferences and capabilities, we are not seeking to design one complete robotic toy that would work with all autistic children. We want to observe the possible factors that might influence the child’s interests in interacting with a robotic toy, like shape, colors, sounds, music, voice, movements, dancing, trajectory, special devices, etc. To do so, different mobile robots have been used in tests ranging from single sessions of a couple of minutes to consecutive use over a five week period, with autistic children or young adults of 7 to 20 years old. This way, our long term goal is to design robotic toys that can take into account the interests, strengths and weaknesses of each child, generate various levels of predictability, and create a more tailored approach for personalized treatment.

2. Mobile Robotic Toys with Autistic Children

Two types of tests have been conducted with autistic children: short sessions at the École du Touret, and using one robot over a five week period with groups of children and young adults at the S.P.E.C. Tintamarre Summer camp.

2.1 Short Sessions

These sessions were held in two rooms: one regular classroom and a 20’x20’ room without tables and chairs. Children were allowed to interact freely with the robots. At all time at least one educator was there to introduce the robot to children, or to intervene in case of trouble. Even though these children were not capable of fluent speech, some were able to understand the short