Choosing a Robot With ASD Children

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Abstract. Children with ASD are generally attracted to robots. To explore this attraction and possible task directed preferences, we set up a small experiment and asked ASD children to choose between three different types of robots for different tasks. They clearly showed task dependent preferences and demonstrated remarkable signs of self reflection.

Keywords: Social robots, autism, ASD children

INTRODUCTION

The use of social (socially interactive) robots can be an effective tool for professionals who work with children with autism spectre disorder (ASD). Many children with ASD are attracted to robots because of their controllability, their predictable and consistent behavior and physical appearance (1-3). The robot can be touched and grabbed and thereby provides an experience in reality. In addition, the robot can fulfill many roles, for example as a mediator, interaction partner or tutor (4, 5).

Within the RoboPlus project, research institutions from The Netherlands, Belgium and Spain collaborate with professionals who coach children with ASD in their daily living activities and communication skills. The focus is on commercially available robots and on integration of robot centred activities within the current approach of the professionals. Research activities are derived from ideas of these professionals, which concerned emotion regulation, social skills development and independency skills (teenage children, learning to live as independent as possible)..

When it came to picking a robot to work with that would be of help to develop independency skills, professional coaches suggested to have their children make a choice, not only to see which robot would be most attractive to them, but also to establish if their choice would be based on general or task oriented preferences. The latter would be an indication that they were able to reflect upon themselves, their condition and the learning environment they were in at that moment.

SETUP

Participants were ASD children who were part of a group in which they were coached to develop their independent living skills. There were 2 groups containing 4 and 5 children, their age ranged from 8 to 16 years. The robots we chose differed in humanoid characteristics and mobility, but were all capable of social interaction:

- A BB8 sphero robot with a 'somewhat humanoid' appearance. It is about 15 centimetres high, has a spherical body with a magnetized appendage for its head. It is controlled by a Bluetooth connection in concert with an app on a mobile device. It is very mobile, with different speeds.
- Cozmo, a little bulldozer (thus not humanoid) or lift truck shaped robot on tracks. It has a pixel screen for use of expressions in a face (mainly eye`s). It has mobility, but less than BB8.
- Meccanoid (version 2.0) , a humanoid robot with very limited mobility and the capability to wave its arms by utilizing the 2 servo`s in each arm. Apart from the mechanical features it also has the ability (even if it is not very robust) to understand certain voice commands.

Figure 1. From left to right: BB8, Cozmo and Meccanoid

For this test we exposed the children to all 3 robots in sequence by their own choice. We asked them the following questions:

Q1.   Which one of the shown robots would be you accept to help guide you with doing chores around the house ?
Q2.   What are your thoughts with this particular robot?
Q3   Which robot is more awesome /cool?
Q4   From which robot would you be able to learn more or quicker?
Q5   Why did you give that answer?
Q6   From which robot do become more or less calm?

For the experiment we had two sessions with 4 children sitting around a table and asked them to meet the 3 robots to evaluate their personalities, behavior and task suitability. After they met all 3 robots, we asked the six listed questions.

Figure 2. Setup

RESULTS

We noticed that children's responses mirrored the energy that the robot expressed. They would become restless when the robot got exited and hyper and they calmed down when the robot asked them question which they needed to answer.

With regard to the specific questions, the interviewed children unanimously decided that the Meccanoid device would be the most acceptable device to use for the purpose of helping with structure in and around the house. They found the Cozmo and (even more) the BB8 too restless.

We listed the answers that were representative for the group in Table 1.

Table 1. Generalized answers.

	BB8	MECANOID	COZMO
Q1	NO SPEECH	YES	To hyper-active
Q2		It talks !!	
Q3	Nothing specific	Awesome	It`s cute
Q4	Too restless	This one is perfect	Better than BB8 but still to restless
Q5	Not enough interaction	Lots of options and speech	To distracting
Q6	Less calm	Calming down	Less calm

CONCLUSIONS AND DISCUSSION

We found it remarkable how the robots' behavior was mirrored by the children. However, perhaps the most significant finding was that the children were aware of the impact of the robots. They realized the

Cozmo and especially the BB8 robots would make them too restless to be suitable for learning tasks.

The actual choice for a Meccanoid could be seen as predictable, but we found it remarkable to be unanimous and well-based on rational arguments.

However, we have to be aware of the limitations of this small experiment: children were interviewed in groups and may very well have impacted each other. Moreover, the choice was limited and the robots differed in more than one aspect. This may be a problem that is hard to overcome when we compare commercially available robots, but it still needs to be addressed.

In future research we suggest a more individual approach of the children and a 'omne at a time' focus on different aspects of social robots.

However, we find that a conscious evaluation of social robots is a valuable exercise that could both train and expose self-awareness and self-reflection of chidren with ASD.

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