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# ***“How do you imagine robots?”*** **Childrens’ expectations about robots**

**Patrícia Alves-Oliveira**  
INESC-ID &  
Instituto Superior Técnico,  
Universidade de Lisboa  
Porto Salvo, Portugal  
patricia.alves.oliveira@inesc-id.pt

**Sofia Petisca**  
INESC-ID &  
Instituto Superior Técnico,  
Universidade de Lisboa  
Porto Salvo, Portugal  
sofia.petisca@inesc-id.pt

**Srinivasan Janarthanam**  
Interaction Lab School of  
Mathematical and Computer  
Sciences  
Heriot-Watt University,  
Edinburgh  
sc445@hw.ac.uk

**Helen Hastie**  
Interaction Lab School of  
Mathematical and Computer  
Sciences  
Heriot-Watt University,  
Edinburgh  
h.hastie@hw.ac.uk

**Ana Paiva**  
INESC-ID &  
Instituto Superior Técnico,  
Universidade de Lisboa  
Porto Salvo, Portugal  
ana.paiva@inesc-id.pt

## **Abstract**

The present study provides a broad understanding about the expectations that children have regarding social robots in two particular contexts: a futuristic classroom and in their personal home space.

## **Author Keywords**

Child-Robot Interaction, Expectations, Social Robots, Education

## **Introduction**

The field of child-robot interaction (CRI) has emerged and literature have been developed regarding children and robots interacting together [2]. Some studies have analysed the beliefs and attitudes that children have towards a robot with whom they interacted [1], while others considered children to be co-designers of new technologies [6]. Also, there are studies on CRI that aim to develop robots for a classroom [5], while others envision robots for a home environment [4]. Inspired in these two contexts for CRI, this study aims to explore childrens’ initial expectations about the future use of robots. Understanding these initial expectations could help to identify the utilities that robots have for them.

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## Method

### Participants

Our sample consisted of 41 children aged between 11-15 years old ( $M=13.66$ ,  $SD=1.22$ ) from two different European nationalities. Thus, 31 of these children were from Portugal and 10 children were from Scotland.

### Procedure

#### *Instrument*

To collect data we used a semi-structured interview format. This interview was individually conducted with each child with  $\approx 10$ min duration. The main topic established for the interview was to understand the expectations that children have towards a robot in a futuristic classroom (Q1) and their personal home space (Q2), and thus contemplated two leading questions:

Question 1 (Q1) *Imagine there is a robot in a classroom. What do you imagine the robot could do?*

Question 2 (Q2) *Imagine you could bring a robot home. What do you imagine the robot could do?*

#### *Coding procedure*

To code qualitative data from the interviews initial conceptual categories were established [8] consisting of ideas from the interviews and complemented with other categories [7][3]. Four categories were set as the final ones: technological essences, life-like essences, mental states, and social rapport (caregiver, tutor, companion, slave, and non-specific roles). Two different coders were used to code data. Cohen's Kappa was used to determine the level of intercoder reliability, showing a very strong agreement at a detailed level of the coding analysis ( $K=.805$ ,  $\alpha=.000$ ;  $K=.763$ ,  $\alpha=.000$ , for Q1 and Q2 respectively).

## Results

### Categories

#### *Technological essences*

This conceptualization considers the robot as an inanimate technological artefact. Children expect the robot to be an artificial entity ("*it's just a robot after all*") without human abilities ("*it does not have ideas of its own*", "*or feelings*" and so "*we will loose interest on him*") and considered different ways for communicating with robots ("*he would communicate by voice-control*" or "*he can even write, I suppose*"; "*it should be well programmed, but people should not depend upon technology*").

#### *Life-like essences*

This conceptualization considers the robot with life-like essential qualities. Children expect the robot to have biological essences ("*he would go to sleep*") and animism qualities ("*express itself as a person, I think that is really possible*"). In brief, they expect the robot to have a human nature ("*be genuine and make decisions in a human based scale*", like "*making mistakes as we humans do*").

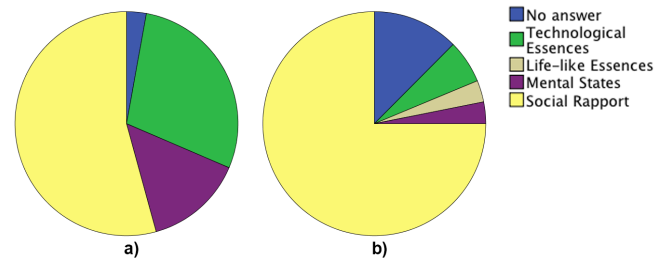
#### *Mental states*

This conceptualization refers to the presence of cognitive ability. Children expect the robot to have mental qualities ("*the robot would have individual thoughts of its own*" and the "*brain of a mega master*"). They expect feelings from the robot ("*he would be happy when we answered correctly and sad when we're wrong*"), and also intentions ("*should be able to do what we do: to choose*").

#### *Social rapport*

Children considered different roles for the robot: They expect the robot to be a caregiver ("*the robot would help on the housework, remembering things that I often forgot, and thereafter, reduce some stress*"), a companion ("*we*

would play together"; "he would be with me so that I am not alone"), a tutor ("I would learn with him"), and a slave ("I would put him studying instead of me, doing my homework, and making my shores").



**Figure 1:** a) Children's expectations about a robot in a futuristic classroom. b) Children's expectations about a robot in their personal home space.

### Question 1

Regarding Q1 overall results (see Fig. 1a) suggest that 54% of the children expect robots to have social rapport, 29% expect robots to have technological essences, and 14% expect robots to have mental states. Expanding the social rapport analysis, results showed that children expect different types of roles when imagining a social interaction with a robot in a futuristic classroom. Results suggest that 40% of the children expect the robot to be a tutor, 3% expect the robot to be a companion, and 11% did not specify the nature of the social interaction.

### Question 2

Regarding Q2 overall results (see Fig. 1b) suggest that 75% of children expect robots to have social rapport, 6% expect robots to have technological essences, 3% expect robots to have mental states, and another 3% expect robots to have life-like essences. At a broader level of social rapport the results suggest that 44% of the children

expect the robot to have a caregiver role, 17% expect the robot to be a companion, and 11% expect the robot to have a slave role.

## Final considerations & workshop expectations

Technology is advancing fast, becoming closer to children earlier in their lives. The presented results suggest that children expect robots to be able to evoke and engage in social interactions and to present mental qualities, integrating the technology in this process. Since children will probably in the future have an active role in interaction with robots, this study provides initial conceptions regarding their expectations. These expectations can serve as initial aspects to further explore CRI in the Workshop.

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## References

- [1] Beran, T. N., Ramirez-Serrano, A., Kuzyk, R., Fior, M., and Nugent, S. Understanding how children understand robots: Perceived animism in child-robot interaction. *IJHCS* 69, 7 (2011), 539-550.
- [2] Breazeal, C. L. *Designing sociable robots*. 2004.
- [3] Bryson, J. J. Robots should be slaves. *CEAC* (2010), 63-74.
- [4] Dautenhahn, K., Woods, S., Kaouri, C., Walters, M. L., Koay, K. L., and Werry, I. What is a robot companion-friend, assistant or butler? In *Intelligent Robots and Systems, 2005.*, IEEE (2005), 1192-1197.
- [5] Deshmukh, A., Castellano, G., Kappas, A.,

- Barendregt, W., Nabais, F., Paiva, A., Ribeiro, T., Leite, I., and Aylett, R. Towards empathic artificial tutors. In *Proceedings of the 8th ACM/IEEE (2013)*, 113–114.
- [6] Druin, A. Children as codesigners of new technologies: Valuing the imagination to transform what is possible. *NDYD 2010*, 128 (2010), 35–43.
- [7] Kahn, P. H., Freier, N. G., Friedman, B., Severson, R. L., and Feldman, E. N. Social and moral relationships with robotic others? In *RHIC Workshop, ROMAN'04 (2004)*, 545–550.
- [8] Silverman, D. *Interpreting qualitative data*. 2011.