Speculative co-design of robots

Victor van den Bergh[a,1] David Robert[b], Nadezhda Zilberman[c]

[a] *Center for Children's Speculative Design*
[b] *Center for Children's Speculative Design*
[c] *Tomsk State University*

1. Introduction

The goal of this 30-minute talk will be to introduce workshop participants to a framework for co-designing robots with children and adults that uses children's imaginations as a starting point. We will share the processes and outcomes of three art and research programmes that have informed this approach, which is being developed by the Center for Children's Speculative Design (C4CSD). The instances to be discussed include an interactive exhibition and workshop held at a major US art museum (Peabody Essex Museum), a gallery exhibition at Harvard University, and an ongoing child-robot-interaction research study in Russia.

2. Speculative co-design approach

Speculative co-design is an imaginative process through which children and adult collaborators can design alternate futures together. The term "speculative" implies that this process is rooted in imagination and explores limitless possible futures, while the collaborative aspect emerges through opportunities for different groups of participants to build on one another's ideas in an iterative and intergenerational fashion.

First, child participants are recognized as co-designers whose opinions and ideas are just as important, interesting, and valid as those of adult "experts." Second, they are encouraged to imagine an alternate future and are told that the future could be whatever they want it to be (e.g. they could imagine a robot that can do whatever they want). Third, participants describe, draw, and create physical models to test their ideas. The models stimulate a discussion of what the future could be like, including the ethics, infrastructure, and other dynamics of this imagined world. The discussion can include the perspectives of different audiences, like adults, who may be invited to build on the concepts and ideas developed by the child designers and thereby continue the design process.

We conceive of speculative co-design as a collaborative thought experiment, the ultimate purpose of which is to continue the tradition of speculative design as described by Dunne and Raby *to open up all sorts of possibilities that can be discussed, debated, and used to collectively define a preferable future for a given group of people* [1]. Through the projects discussed below, C4CSD hoped to raise diverse voices in the ongoing wider discussion about how robots can and should be designed for children.

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[1] Corresponding Author.

3. Art and research applications

3.1. Speculative Life Forms

Speculative Life Forms (SLF) was a "program for speculation and iterative creation of hypothetical robotic life forms and models for their physical, social, and emotional (un)realities" [2] developed at the Maker Lounge of the Peabody Essex Museum in Salem, MA. It was co-created with 144 U.S. and Russian children aged 8 to 11, young students from The Phoenix School in Salem, and the voluntary participation of museum visitors. The project examined human-robot relationships through speculative design [1] and description done by children in facilitated workshop settings, responding to age-appropriate design questions of empathy such as "Do you want robots in your life?" and "What behaviors do you want them to have?" Exhibited drawings and descriptions of robots conceptualized by children in both the United States and Russia formed the basis of the program's experience inspiring further creative iterations and physical model building.

The goals of the project were to (1) Create a space in the museum that scaffolds collaborative free-thinking across age, distance and culture; (2) Activate a speculative co-design framework through which the public was invited to consider and help shape how the world *could be* rather than *should be*; (3) Spark an inter-generational, physical model-making experience using kids' robot design as the inspiration for iterative prototyping.

The project began as a response to trends in the rapidly expanding robotics industry, in which robots were being designed for children without incorporating design input from children themselves. This led to C4CSD's creation and validation of the COIRS evaluation instrument [3] to measure children's openness to interacting with a robot, a research tool currently fielded in *child-robot interaction* studies. The scale is useful in giving voice to children's dissent or assent and learning their preferences for interacting with robots.

3.2. Children's Imagined Robots: an invitation to (co)design

Children's Imagined Robots was a one-month exhibition at the Harvard Graduate School of Education (HGSE). Eighty-four US and Russian children's robot designs were exhibited in the gallery space. Adults with expertise in the field of education engaged in a speculative co-design activity with the drawings and imagined and recorded hypothetical learning applications for these robots. We found that these educators greatly enjoyed engaging with the young robot designers' ideas and were readily willing to co-design with them.

3.3. Research on Russian Children's Preferences

Ongoing research by Professor Nadezdha Zilberman at Tomsk State University analyzes Russian and US children's imagined robots using their drawings and written descriptions. By means of linguistic analysis, Dr. Nadezdha draws insights into children's preferences for the appearance of social robots in various professional roles and cross-cultural differences in their attitudes. Her work adds both a methodological contribution as well as a cross-cultural analysis perspective.

3.4. Discussion

These three projects implemented and advanced the speculative co-design approach being developed by C4CSD, while also amplifying children's ideas in the discussion around future robotic technologies.

Speculative Life Forms was an opportunity to display children's imagined robot designs in a museum setting for consideration by thousands of museum visitors in a formal context. The workshop that took place with local school children resulted in a physical model, which aided the discussion of what a world with robots might look like and facilitated further co-design. The exhibition at HGSE was an example of intergenerational co-design and it showed that adults were eager to contribute their perspectives and ideas to the discussion. Finally, the ongoing research of Professor Zilberman contributes a formal analysis to better understand children's preferences and underscores that imagined robot designs are culturally influenced.

4. Conclusion

The talk will tell the story of the development of a speculative co-design framework through three cross-disciplinary instances. Recent developments of the *International Archive of Children's Imagined Robots* will also be discussed.

The talk will set the stage for an interactive workshop activity that incorporates an exhibition of children's designs at Robophilosophy 2016. Participants will be encouraged to imagine real-world scenarios around the children's proposed robot designs and the ethical implications that may arise. By suggesting and discussing ethical implications, ideas for CRI design rooted in the imaginations of children will be collected.

References

[1] A. Dunne & F. Raby, Speculative everything: design, fiction, and social dreaming, MIT Press, Cambridge, 2013, p.6.
[2] D. Robert, Retrieved from:" http://www.davidyannrobert.com/speculative-life-forms/"
[3] D. Robert & V. Van den Bergh, Children's openness to interacting with a robot scale (COIRS), *Children's openness to interacting with a robot scale* (2014), 930.