THE BUNNY IN A BOX - DESIGNING A DIGITAL PRACTICE PET FOR CHILDREN

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ABSTRACT

Testing young children's ability to relate to and take care of an animal - before actually having a real one on hand - is a desirable idea, but is it possible? The concept of "the bunny in the box" relies on creating the feeling that there is an actual pet present, using current technology and electronics (a tablet, vibrations, sound, LED lights, etc.) without the children being able to see an actual animal. Children were involved throughout the whole process, from co-design to evaluation, and their behaviour towards the bunny were observed. They reacted positively to its requests, and were able to take care of it as well as remembering the encounter for a long time period afterwards. The paper presents and analyses the design process and the prototyping sessions.

INTRODUCTION

Most - if not all - children that play exhibit patterns that involve nurturing and caring for others. It can be as simple as having a teddy bear that they tuck in at night, or more elaborate plays that involves different roles, and mimicking parenting skills from their own experiences. So it usually comes a time in every parent's life when the child starts asking for a pet, more or less intensely.

Even if the parents would want to accommodate the child, the reality is not so simple. It takes a lot of time and cost a lot of money to have a pet. It is also a large responsibility. If/when the child lacks the skill or interest to take care of the pet it falls back on the parents to do so - an animal is not something that can lay about in the home unattended. This is the reason why there is a value in having something to practice with, that doesn't have real feelings or needs; a "practice animal" that ultimately will let you test if the child is mature enough for the responsibility of an actual pet. This report presents and analyses the process that we used when designing an interaction module for this purpose, including co-design and evaluation done together with children in a group.

RELATED WORK

Building robots have been a human dream for a long time. Science has finally caught up to the science fiction and we are experiencing more and more advances within this field. If a robot is human-like, children deem it aggressive, but if it is clearly a machine with human traits, children say it's friendly (Woods 2005). When instead talking about robot animals the term is zoomorphism. According to Schmitz (2011) the keys that trigger zoomorphism are the visual appearance, the voice, and the behaviour. The behaviour should be proactive, autonomous or maybe even stereotypical (he mentions shyness as an example).

Robots are now also used for educational purposes. Gwo-Dong et al. list three types of educational robots: learning materials, learning companions/pets, and teaching assistants (2011). They also conclude that pets are good for catching the children's imagination. Robotics can be a way to enhance the learning experience. Pets are good for children's socio-emotional development and seem to be an emotional support for them in different ways, both as comfort during hard times and as facilitators in social situations (Hurley 2014). As stated in the introduction, there are also lots to consider before including animals in the family, and if it is possible to test if the family is ready to get a pet before actually getting one it would be a good thing.

On the subject of robotic pets, one example is the robotic dog, AIBO, which is able to behave much like a

real dog would. When tested by Francis and Mishra (2009), children reported that they felt that the more interactive toys were considered more real. This could mean that a learning experience with a robot that the children can interact with will be more beneficial than a simpler robot. A more life-like experience will better serve as a scaffolding to help children acquire new knowledge.

CONCEPT

We started off by taking zoomorphism to an extreme, to see if children would care about something anonymous. Therefore we designed a "bunny in a box", based on the concept of the sheep in the book "The Little Prince", by Saint-Exupery. The idea is to interact with the bunny in many different ways without being able to actually see it: through a screen, with sounds, by petting it, etc. This concept was intended to answer the following questions:

How are the children's initial reaction to the box, and will they keep interacting after the initial contact?

Do they express emotions toward the alleged bunny in the box? If so, in what way?

Will the children use the box in the way that it is intended; i.e. are they reacting to the bunnies needs?

The process to come up with the final idea and to evaluate it is described in the next sections.

FIRST PROTOTYPE AND CO-DESIGN

To better understand how the children would respond to the basic concept, we involved them in an early stage using a low-fidelity prototype. The main interest was to find out how the interactions with the bunny should be designed to make the children relate to the pet in the best manner.

PROTOTYPE

Figure 1: First prototype: (a) box with openings to feed (orange),give water to (blue) and pet/play with (green) the bunny and clean the cage (red), (b) loose parts (here drops of water and carrots) made of clay.

 A simple card-board box was used (figure 1.a). We defined here six different kinds of actions: feeding, giving water, cleaning the cage, petting, playing, and sleeping. The first three actions were supposed to be realised by using objects made out of clay (figure 1.b). The children could pet and play with the bunny by putting their hand through a hole and feeling a stuffed animal. On the box itself there was a plastic pocket with a simple silhouette of a bunny, and cut-out symbols

used to communicate. Then the children should know what the bunny needed and act accordingly.

CO-DESIGN: PROCESS

The experiment was intended to be conducted in Sweden. However only one of the two moderators was a Swedish speaker (A). Therefore A talked to the children while the moderator B was monitoring the "symbols" requirements.

Instructions were that there was a shy bunny in this box, and that it needed some help in order to be happy. Explanations about the items of food and water, the corresponding openings in the cage, and how to clean the cage from poo, were then provided. During the test pictures on the display were changed (manually) to see if the children could understand what the bunny wanted.

We wished to have an open design in the sense that we wanted the feedback from the children to be as simple as possible to integrate in our design. At the same time it needed to be presentable and a lot of choices had to be made initially. We made the cage pretty small, with just enough room for the tablet, thinking this would make it more believable concerning the size of the bunny inside and the bunny shown on the screen.

The method used to collect data from the tests relies on three basic principles: verbally-intentional (feedback that the children provide to the moderators), verbally-unintentional (children talking to each other) and physically (actions performed).

CO-DESIGN: RESULTS

The co-design group consisted of three children that all knew each other well beforehand, two boys of 2 ½ and 4 ½ and one girl of 3 ½ years of age. A larger group of children would have had a hard time to fit around the box at the same time and would therefore probably result in a lack of focus around the project. A smaller number of children would not have given us as much feedback, so three was considered an optimal number.

Overall, there was good group dynamics during the co-design. The test went well in general, since the children understood most of the symbols instantly and responded properly at the beginning. The children were engaged and collaborated together on figuring out the box. They spent a lot of time arguing about if there really was a bunny in there or not, before concluding that there must be, even if the stillness and the quietness of the stuffed animal were counter-arguments. At one point the 3-year old said "It's so cute" referring to the bunny. They understood the link between what the bunny asked for and the different clay items.

However, some problems occurred, mainly due to misinterpretations and unintended use. The symbol for cleaning the cage was a broomstick, which was understood as the bunny wanting to go out to fly "like a witch". The absence of reaction from the picture – as a visual feedback - was a bit disturbing to them. The loose parts were first put in the proper holes, but then in a lot

of places where they weren't intended to be (figure 2.a). They used the hole in the box to look for "treasure" and spent a long time "poo-hunting" when we showed them the picture with poo. Finally it was difficult for them to know how to respond to the "play" requirement. They were often trying either to pet the bunny or to get it out of the box. Freeing it quickly became a main focus of the exercise- and they nearly ripped the cage apart trying to do so. Several times they managed to get the bunny's' ears and/or head up through the petting hole and they displayed great happiness in doing so (figure 2.b). In the end, the 2-year old drifted off a bit, indicating that the interactions were maybe not catching enough for him (figure 2.c).
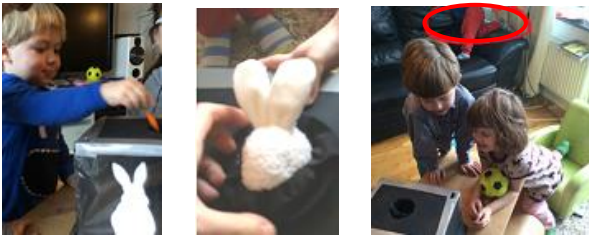

Figure 2: What went wrong in the co-design: (a) placing the loose parts where they didn't belong, (b) focusing on "rescuing" the bunny, (c) lack of attention.

EVALUATION

The high-fidelity prototype took all previous remarks into account. In order to answer the questions defined earlier, we decided to evaluate it into two steps: two sessions with the same children (the same as in the co-design) and the same settings and processes. The first one occurred five months after the co-design and the second one seven more months later.

PROTOTYPE

Figure 3: Second prototype with an app-solution and electronic interactions: feed (orange), giving water (blue), cleaning (at the back)

We did a large amount of changes between the first box and the second, regarding everything from materials to design solutions. The loose parts were removed and replaced with electronics. Therefore the new box was fitted with led-lights in different colours to symbolize the food, the water and the poo. The bunny was also able to vibrate. A tablet was fitted onto the box, so that all the interaction with the bunny was also done digitally by the children in the form of an app, with a clock regulating a limited amount of regularly appearing interactions. The children had to interact both using the app and physically touching the box in different ways.

The app still deals with communication with symbols from the bunny but also shows reactions when an action has been selected, while interaction with the box will result in physical input to the bunny, i.e. caring for it. Sound feedback was also added and the stuffed animal was fixed to the ground of the box to prevent it from being taken out.

EVALUATION'S PROCESS

Since the kids now had previous knowledge about the bunny in a box concept, and all three of them have played with tablets before, there was an opportunity to take a step back and observe, rather silently. Our strategy was to let them figure things out mostly on their own. This time A had to be a passive observer who took notes while B talked and communicated with the children by only using body language. So the children could not get any useful oral instructions from B.

FIRST SESSION RESULTS

As expected the children remembered the bunny and were very happy to see the cage. This time they did not argue about if the bunny was real or not. In general there was a good flow and the problems observed during the co-design were solved.

The children did not focus on freeing the bunny this time and didn't even mention it. The youngest one did have the patience this time to be there and to participate throughout the whole session. All of them were very much engaged in play (figure 4.a) and caretaking and they collaborated a lot to look after the bunny. It is probably due to the more relatable depicting of the bunny, which was more detailed and had some facial expressions, movements and reactions.

The use of haptic, light and sound feedback was indeed very valuable. The children related to them to understand what was going on. At one point during the evaluation, the vibration motors stopped working, so the 3-year old thought that the bunny was asleep and stopped petting it, but when looking at the display she saw that it was in fact awake, craving a carrot, so she stated: "It is awake! Then I can continue cuddling with it!", and then she did. This simple statement suggests three important things: she wants to interact with this "fake" bunny, she shows consideration toward it, and lastly she trusts the display to be giving her information about the bunny. It indicates how primordial the visual animation and adequate feedback are to young children. Removing the tangible items was also really helpful since it limited the possibility of creating a disorder and the children were better focused on the intended tasks. The duality of interacting with both the interface as well as the stuffed bunny in the box did not seem to bother them at all. They interacted both by touching it and pressing the right symbols on the interface.

They were very reluctant to leave the bunny alone when it was time to go. We also asked them about the bunny and they described it with adjectives like "kind", "cuddly" and "pretty". The two-year old even gave the

bunny a name (Massej/Massey). The children kept asking about the bunny for days after the evaluation.

Figure 4: Evaluation: (a) first iteration, the children are focused and explore the connection between an action and the coloured lights in the box, (b) second iteration, the children move around the box and play with it.

FOLLOW-UP SESSION

Encounters revealed that the children had not forgotten about the bunny. The 3 ½ year old, now 4 ½ year old, was continuously talking about the bunny, and moderator B whom she thought owned the bunny. This is a strong indicator of success, since it occurred spontaneously and after such a long time period afterwards. The oldest child also remembered the bunny, but did not express any excitement about the upcoming event. We interpreted it as a sign that he was grown out of the age category for this kind of play. Our guess was that the 2 ½ year old, now that he is one year older would be able to interact on a deeper level.

The assumptions were right for the two youngest children, but the oldest one was also very involved. In general, the behaviours were similar to the previous session. The oldest boy was continuously asking "What does the bunny want to do now?". Similarly to last time, the youngest child was the least engaged, but kept up the interest for a longer time period than during last test. All played longer with the prototype this time and they still talked about the bunny like it was living for real, very attentive to its needs and feelings. At one point they had to clean the cage and the youngest child shouted "Ew, I got poo on my hands!", which collected sympathies from the others. The event of cleaning the poo was the one where most collaboration occurred. This event triggered indeed both front and back of the box (figure 4.a), prompting them to watch both sides and letting the others know what was happening.

DISCUSSION AND FUTURE WORK

The project revealed promising finds about how young children can relate to an anonymous pet; they seemed to perceive it as real, wanted to take care of it, and kept being interested for months - even though they had not seen or heard about it in meanwhile. They also showed feelings towards it and responded correctly to the bunny's needs. Then another question can be raised: did the children relate to the bunny as an animal or as a toy?

To be able to answer that properly, the prototype needs to be improved. This could be done by making a more tangible bunny displaying life-like behaviour and spend time on making a "free" toy bunny that the children

could touch and interact with, that would have some movement and be able to make noises. It would probably help younger children better apprehend the concept and connect to the bunny on a deeper level. We would also need criteria to evaluate if the child is ready. One suggestion is to measure the continuity of the care, which will have to be done by a continuous period of time instead of just two separate evaluation sessions.

Involving children in our project was the key of success which helped us adapt to their understanding. They don't think as adults and tend to have reactions that we wouldn't even have imagined. This is well illustrated by the tangible items. We imagined that the children would relate more to them than to lights but changing the interaction did not bother them. However the loose objects were also distracting and the children started using them for unexpected purposes. On the other hand, this led to a development in concept that we would not have reached on our own.

How does our design relate to Schmitz's findings? The visual appearance is unorthodox because the bunny is both visual and hidden at the same time. The behaviour is not proactive, but the repeating patterns makes it autonomous and its shyness can be viewed as a stereotypical behaviour.

CONCLUSION

This paper presents a project using design methods involving young children throughout the whole process. The collaboration with them enabled building a prototype that takes their understanding of abstract into account. The result is a hidden bunny in a box, which the children of the study have interacted with - in much the same manner they would with a real, live pet.

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