The Interactive Emotion Pillow for Children: the Furling

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ABSTRACT
The aim of this project was to create a way to help children learn about emotions, while promoting physical and social play. The gap between different playing styles was also sought to be bridged. A concept was constructed where pillows with several interactive characteristics could be put together like building blocks. Specifically, the prototype of a pillow that would audibly display six distinctive emotions depending on how the user touched it was created. This pillow can help children explore emotions in a playful manner, thus developing their socioemotional competence. The solution can also be very helpful for children with a diagnosis in the autism spectrum, or with developmental disabilities. The project was developed with the co-designing help of children from the 2nd grade and a three-year old test user.

Categories and Subject Descriptors
H.5.2 [Information interfaces and presentation]: User Interfaces. – Haptic I/O.

General Terms
Design, Human Factors

Keywords
Socioemotional development; interaction design; physical play; playing styles; learning

1. INTRODUCTION
What do children need? The answer, one could say, differs according to the child. But there are similarities. Piaget divided a child's development into different stages that the child would pass through [8]. So did many that followed, for example Erikson [4]. When we consider these and other theories of development, what we find uniting is the goal: a child is to develop into a well functioning part of a society. Intelligence and social competence are what we want for our children. Several studies have been made on how to further this. Pretend play is one factor that has been found related to better language and socioemotional functioning [5, 9]. It is an act very well suited to learn perspective taking and empathy [7]. The very act of playing with something that is infused with an empathic stance, forces the child to practice walking in someone else's shoes. Taking on other's perspectives, children get to experience other's emotional states. Engaging in pretend play is related to the ability to understand other's emotions.

Different children play in different ways. Resnick and Silverman groups different ways of playing, designing and thinking as "hard" and "soft" styles, where hard is about math and natural sciences and soft is more about drama [10]. They put forward that the soft has often been neglected in favor of the hard. Perhaps this is a result of trying to increase an interest in mathematics and natural sciences, but in that case it might be misplaced. According to Shonkoff, the emotional development and the development of intelligence goes hand in hand [11]. As children learn to control their emotions, intelligence will also develop along with social skills. This could be an important aspect when trying to make children ready for school.

Our project stems from these discourses: the development of emotional competence, and the fusion of soft and hard styles of playing. We also want to further children's physical activity. The lack of this is something that technological designs are often criticized for [2]. Physical activity promotes not only health but also develops social skills, as communication is often needed. Bekker et al. Have developed three design values to support designing for physical play and social interaction: concepts should give motivating feedback, support open-ended play and create social interaction patterns [2].

We want to create pillows which you can build together to create larger forms. They will be cube formed, approximately 30x30x30 cm. They will also be interactive in several ways: the first group will be active in that they can move. The second group will contain recorders and playback options for visual and audio input/output. There are already toys which behave in these ways (for example *Cubelets* produced by Modular Robotics). The novelty with our project comes with combining this hard playing style with a soft one.

The third group provides emotions depending on how the user interacts. By adding this third group we want to attract children of both hard and soft disposition and perhaps help to bridge the gap between the two styles. Because of the size of the pillows, the children will be able to climb and throw the pillows as well as create even bigger objects, which you can, for example, climb into, thus promoting physical play. Because of size and

Paper presented at SIDER'14
Royal Institute of Technology, KTH,
Stockholm, Sweden

technology involved, we expect the production costs for these pillows to be rather high. We intend them for larger exhibitions or places where lots of children come to at once, rather than at a home setting. This will also provide possibilities of cooperation and social interaction between children. The emotive interaction that the pillows provide help children investigate and experience different emotions, thereby stimulating the children's emotional development.

Emotive pillows has been researched and developed before, among others *eMoodies* by Björkman et al. [3]. Our project differs in that it is aimed at children and their needs, while also taking into account the different playing styles. Our idea will also interact differently with human beings, in that it will pick up on tangible cues and react with an emotion fitting to the touch. For the duration of this project, there was only enough time to develop a part of our entire concept. We chose the emotive pillow, while we find this the most interesting: it will be directly emotionally interactive with the user and will therefore invoke anthropomorphized conceptions, thereby perhaps becoming a playmate to children by which they can practice emotions. This pillow fills a pedagogical gap that already existing toys does not. This pillow would also be interesting to work with among children with a diagnosis within the autism spectra, or children with developmental disabilities. These children often have a difficult time recognizing and controlling emotions, as well as engaging in social play [1, 6]. Our project supports just that, and we find that this is another great example of where the emotive pillow could help children.

2. METHODS AND RESEARCH APPROACH

Our first step was an observation conducted at Världskulturmuseet in Gothenburg. We went in with an open ended question about what children found interesting in a museum. We also wanted to see how children interacted with things designed specifically for them. In the museum there was an exhibition targeting children, where the room was filled with different stations built to interest children of all ages. This was a good scene for us in which to conduct our study.

Picture 1: The prototype; the Furling.

We also engaged children in 2nd year of school to help us co-design the emotive pillows. Our goal was that the children would help us understand how they thought about emotions. We wanted to use the "bags of stuff" technique as explained in Walsh et al. [12]. However, because of a misunderstanding with the children's teacher, there was no time for this. Instead we used value discussions as a technique along with drama exercises. In this particular setting, this meant that we discussed different emotions, how they occur and how they interact. We also observed how the children acted them out in a drama exercise. The purpose of this was to understand how children think and act when it comes to emotions. We chose children in the 2nd year because they would have an easier time verbalizing and explaining emotions, while still being young enough to play an exploratory role. It was also a matter of convenience, since we lacked time and connections to other groups of children. We hypothesized that slightly older children than our target group would better understand the questions and problems we wanted to explore.

After this co-design, we prototyped some pillows in cloth and foam rubber. During the time of this project we did not have the time to develop the technologies involved in making the pillow react to different ways of touching. Instead we used the "Wizard of Oz" technique when evaluating the prototype. The user test took place with a child of three years, in a quiet setting. The child was invited to try out our new toy, a pillow. We videotaped the encounter to be able to further evaluate this afterwards. We used the design values from Bekker et al. to work as a framework from which to analyze the user

3. RESULT

3.1 Observation

During our visit at the Museum of World Culture, we noticed some things that influenced our design choices. First, we noticed that one of the things that the children really liked was a corner with soft mattresses and pillows, which they used to make large piles. Second, we observed that there seemed to be a focus on designs made exclusively for children; there were screens placed on a height level suited for kids that were difficult for an adult to interact with, and they also had spaces that only small people could climb into. This shifted our focus to wanting to create something that really focused on features that are specific to children. Resnick and Silverman talk about the importance of designing things that are enjoyable for both children and adults [10], but we disagree with applying this approach to all projects. We wanted to design something for children primarily.

3.2 Co-design

Our fieldtrip to the Sisjöskolan did not go exactly as we had planned it, since there was a misunderstanding concerning how much time we had with the children. Because of this, we had to skip one part, where the children would do mood boards of what they associated with different emotions. Instead, the value discussions and the drama exercise took precedence. We got to hear a lot of interesting thoughts about the children's relations and experiences of strong emotions. During the first exercise the

children acted out different emotions, and we found that they were very good at putting sounds to them. This influenced our design in that we put a lot of emphasis on audio feedback.

3.3 The Furling

Our final prototype is a cube-shaped pillow made of foam rubber covered with a fabric with a leopard print. When you interact with the pillow, it will respond in different ways depending on the type of input. We call it the Furling.

3.3.1 The look

We choose the cube shape since we wanted our prototype to be part of a buildable concept. The complete concept involves several Furlings that can be used together to build things, and that can interact with each other. In this project the time was not sufficient to implement and test these functions, but we still wanted to keep possible extensions in mind when designing our prototype.

We did not want to give the Furling a face, since any facial expression would necessarily be associated with emotions, and we wanted to keep this out of the equation and instead chose to focus on the audio feedback. However, we still wanted the Furling to look like something animate. This is the reason for the leopard print.

3.3.2 The interaction

The Furling supports six kinds of interaction: petting; hugging; tickling; throwing/running with; hitting and screaming. We designed the responses to these different interactions as different emotions manifested through sound. When we decided which emotions should be connected to which action, and what the audio feedback should be, we used our visit at the second graders at Sisjöskolan as basis. This resulted in the Furling purring when being petted, making kissing sounds when hugged, laughing hysterically when tickled, screaming when being thrown or run with, crying when being hit, and growling when being screamed at.

3.4 User Test and Evaluation

For the user test, we didn't have the finished prototype. Instead we used a regular pillow augmented with the "Wizard of Oz" technique. We don't believe this influenced the results much, since the focus of this test was on the interactions and if they worked. When we tested the pillow with a three year old girl, she was first a bit shy and tentative about what to do, and she asked if we could show her. After we helped her to break the ice she was much more forward and showed great joy when interacting with the pillow. The girl was actually the daughter of one group member, which have to be taken into account when analyzing the results of the user test. The fact that we only tested one child, and that it took place in a home environment is also of importance.

Our tester quickly learned that the pillow gets scared when you throw it or run with it, and did not want to subject it to the negative feeling when we suggested that she should throw it again, even though she enjoyed throwing it the first time. However, towards the end she wanted to run with the pillow, and when we asked how the pillow would react she replied "Yes, 'Help'!". She could also anticipate the pillow's response

Picture 2: During the user test

beforehand. Even though we gave her a lot of clues about possible interactions with the pillow, and explained a couple of the feelings to her before she had time to do it herself, she said that the pillow would be sad if she hit it and did not want to do it without any input from us.

Throughout the testing session, she seemed to enjoy playing with the pillow, and to provoke different responses from it. She especially seemed to like the kissing sound. She played with the pillow with some help from us for about twenty minutes, after which we decided to stop the test. She still wanted to keep playing after that, and also talked about wanting to play with the pillow the next day.

As for the design values from Bekker et al., we found that the pillow fit good into the frames. It gave audio feedback, that worked as motivation for our tester thus fulfilling the first value, giving motivating feedback. She often looked for a certain reaction in the pillow, and changed her behavior accordingly. It did in some ways support openended play, but this would be even more pronounced with the concept as a whole. When the pillows can be built together with each other, you can literally take the emotions on a roller-coaster. There is also some support for social interaction. For our tester, this was obvious as she wanted some company in playing with it. With the entire concept, it will be even more supported since the pillows will be big enough for children to build things to play with together.

4. DISCUSSION

Even though it seemed like our tester really enjoyed playing with and exploring our prototype, there are still some issues that have to be discussed. First, she might have been acting differently if a person she did not know had helped her with the interaction. That her mother spoke positively about the pillow, and encouraged her to play with it, could have made her more positive towards the play. However, it could also have helped her relax and let go of her shyness. It is also likely that the pillow would be used in environments where the child feels safe, and

with people she knows, if it would be used as an ordinary toy. Second, we helped her quite a lot during the testing session. This is likely to have influenced her during the testing. If we were to test the pillow again, it would be interesting to do several tests with several different users where we could also see how much each of these factors contributed to the outcome. We could for example ask what the tester thought that the sounds from the pillow meant, and what sort of action that could provoke that sound. Third, since we only tested the prototype with one child, it is hard to draw any general conclusions. The pillow should be tested with several children, perhaps of different genders and ages, to get a better view of how it can be used. It would also be rewarding to see how children play together with the pillow, and if it affects the social interaction between the children. Fourth, since we tested the pillow during a limited time, there is no way of saying for how long a child would find it interesting. Perhaps it would benefit from having more sounds and interaction possibilities, such as playing a sound when it has not been touched for some time. This is also something that we noticed in the user testing: it could enhance the child's curiosity if the pillow made some random noises.

With that said, we could still make some interesting observations during the user test. Our tester seemed to instantly attach some sort of consciousness or soul to the pillow. Even before it had made any sound, she expressed being shy when meeting the pillow for the first time, and wanted her mother to start the interaction. This is something that we wanted to achieve, since it was important that the child perceived the pillow as something that could possess real feelings. She could distinguish between the "positive" and the "negative" feelings expressed by the pillow, which was something that we wanted to investigate. Third, the pillow seemed to encourage her to try her theories about emotions, like when she wanted to throw the pillow again to see if it would still respond in the same way as before. Fourth, the fact that she was hesitant to make the pillow feel any negative feelings also indicates that she perceived it as something living, and that she does not believe that you should hurt things with feelings. Our tester seemed to have a pretty good grasp on different feelings and which actions that could provoke them beforehand, but it was still interesting to see that she talked about the pillow in these terms.

During the project, our target age group changed from 7-8 year olds to 3 year olds. This partly comes from narrowing the project down to include just the emotive pillow and not the entire concept. Since the prototype we have now consist of only one pillow, the focus could only be on the emotions that arises from the interaction between the pillow and the user. We would have liked to extend the prototype to fit our original idea of different pillows that can be built into a new whole, and that can interact with each other. This would probably fit a larger span of ages. It would also have been interesting to test to design with children that have more problems with understanding and coping with emotions, such as autistic children, or children with developmental disabilities.

5. CONCLUSION

Since we have only tested the prototype with one child, it is difficult to draw any general conclusions. But our test indicates that the pillow could be used to get children interested in exploring different feelings. It was also evident that the child we tested on enjoyed playing with the pillow, and that she would have liked to play with it again.

As for the methods used, playful exploration in the form of drama exercises and value discussions proved very fruitful when working with children. These methods should be evaluated and developed further. The children involved in this project were eager to enact the different emotions, which also could be seen as an indication that exploring emotions is important and interesting for children of this age. Our conclusion is that building block pillows with emotive qualities are an interesting field for further research and development.

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