Co-Designing with Children: A Comparison of Embodied and Disembodied Sketching Techniques in the Design of Child Age Communication Devices

Fabian Hemmert, Susann Hamann, Matthias Löwe, Josefine Zeipelt, Gesche Joost
Deutsche Telekom Laboratories
Ernst-Reuter-Platz 7, 10587 Berlin, Germany
{fabian.hemmert, susann.hamann, matthias.loewe, josefine.zeipelt, gesche.joost}@telekom.de

ABSTRACT
In this paper, we present a qualitative comparison of different sketching techniques, assessing their suitability for co-designing interaction design with children. It presents a study conducted in an experimental field research, in which children aged 6-12 were engaged in a co-design process, aimed to the creation of novel communication devices or services that fit their particular needs. The study compared embodied, physical sketching (body storming that was documented as photo stories) with disembodied, drawn sketching (comics), as for their creative results, and how the children, reportedly, felt during the creation process. The results indicate that embodied sketching techniques were more suitable for the children, both as for the quality of the results, and for the subjective experience of the children while designing.

Categories and Subject Descriptors
H.5.2 [User Interfaces]: Prototyping

General Terms
Design, Human Factors

Keywords
Sketching, children, design process, communication devices, mobile phone, embodiment

INTRODUCTION
It is considered common sense that children are, generally speaking, creative. Due to this fact that they are likely to play a major role in co-designing processes, that means they are actively and on an equal level involved in a design process together with trained designers. In fact, their potential as co-designers is a widely researched topic, growing in the interest it receives from academia. In children’s creative processes, especially when co-designing, sketching can play a central role. The positive effects of sketching for adult co-designers have been researched extensively. Generally, it appears – in theory and practice – that sketching is a worthwhile activity for ideation. Several techniques and styles of sketching are commonly used, and they usually selected by the current phase of the creative process. But which styles of sketching are suitable for co-designing with children? While sketching for adult co-designers is primarily determined by the stage of the ongoing design process and well-researched, there is still a knowledge gap about the appropriate selection of techniques for child age co-designers. Our hypothesis was that methods that work for adults may not work for children in the same manner. Therefore, it appears worthwhile to research the topic of sketching, with a focus on children as co-designers.

BACKGROUND
This section reviews relevant related work in the literature, in order to clarify the knowledge gap this research attempts to close. It is structured into three sub-categories, outlining existing research on the creativity of children, research on the potential of sketching in general and an overview over literature concerned with ‘Embodiment’, which may provide a suitable basis for an initial distinction between techniques of sketching. We conclude this section by summarizing that the recent discussions of embodied interaction may provide valuable theory, which is, however, not explored sufficiently in the practice of co-designing with children – a circumstance that provides the motivation to conduct this study, which will be presented in the next section.

Children as Co-Designers
Generally, co-designing with children is an area of research that has not been as widely explored as co-designing with adult users. Nonetheless, existing research has demonstrated children to be avid co-designers, primarily when engaged in making things [5], but often facing issues of group dynamics [10]. Work in this field often involves drawing [7, 11] and acting [1].
Sketching
Sketching is, generally speaking, a direct and creative method for visualizing ideas that is commonly used in design processes. It has advantages in being visual and concrete, without using abstract verbal descriptions. In the design process, the role of sketching is considered central for early hands-on experience and further fostering of the creative process [6] – be it in hardware or drawn form [4]. Disadvantages might be that people not trained in drawing often refrain from this activity as they fear to go wrong or to be blamed. Therefore, to use this technique highly depends on the context, the people involved, and the aim of the design process. Psychological theories support the positive sides of sketching, emphasizing the effects of physical manifestations of thought processes. An example is Galperin’s theory of ‘exteriorization of thought’ [2].

Embodied Interaction
Embodiment is an important parameter when investigating forms of non-verbal expression and knowledge. With the special focus on children, e.g. tacit knowledge [9] or embodied experiences become even more relevant as they are linked to subtle, not-explicit layers of perception. Embodied Interaction is an emerging field of research in Human Computer Interaction (HCI). In his book ‘Where the Action Is’ [3], Dourish argues that after the symbolic, textual and graphical paradigms of HCI, an ‘embodied’ style of interaction will be next. His conception of embodiment is ‘physical and social’ and aims at involving the whole body in the interaction with computer systems. O’Neill adds a semiotic perspective, conceptualizing embodiment as ‘Being with Media’ [8], in a sense that includes the terms of ‘affordance’ and Peircean ‘firstness, secondness and thirdness’. These two concepts seem to provide fruitful ground for the development of new physical, social devices.

PROJECT DESCRIPTION
The reported study was conducted in the course of two workshop days during ‘Street Lab’ project, which took place in Berlin-Neukölln in August, 2009. Berlin-Neukölln is a low-income area of high cultural diversity, and the overall project goal was to investigate the specific communication needs of children and youths from this area. In a one month timeframe, over 100 children from 10 different nationalities took part in the “Street Lab". In collaboration with local youth clubs and in an interdisciplinary team of design researchers, social and education scientists, we engaged in an open research setting offering different playful workshops for children on aspects of communication and technology. As one of the projects running during the Street Lab, this study was concerned with the topic of “Secret Communication" amongst children. As a research focus, we investigated the appropriateness of different sketching methods for co-designing with children. We compared two similar sketching methods, with different degrees of embodiment involved. Each method makes use of image sequences as the means of communication, but the creation of these images varies.

HYPOTHESES
This project investigated two hypotheses: Firstly, it was hypothesized that in the design process on secret communication, an increasing niveau of embodiment would increase the level of detail in which the scenarios would be formulated (H1). This hypothesis is based on the assumption that children would have problems in drawing detailed interaction concepts, and that posing, e.g. by a plush animal, and even more by themselves,
would be easier for them and allow for increasingly refined expression of their ideas. Secondly, it was hypothesized that increasingly embodied sketching would, at the same time, limit the children’s creativeness in their proposals (H2) – based on the assumption that everything can be created on paper, but increasingly embodied – and thereby real – sketching makes it harder to create novelties.

**Comic Drawings**

The comics the children drew revealed issues in their composition process. One result (Fig. 1) was a comic in which the participant had drawn all action in the bottom-left and bottom-right panel, telling the story while drawing, and altering between the panels, but drawing subsequent actions over the preceding images. The phone here is similar to a Swiss army knife. The story that the child told was that of a pistol which could be unfolded from the phone. As researchers, we were quite shocked about this functionality as we assumed that it gives a clue about the children’s social reality. But this might not be true as children often play games of cops and robbers. We do not have a solid interpretation of this creation. Another result (Fig. 2) was a comic that was sequentially showing action, but lacking interactive expressivity. The participant was able to express his idea verbally, but not in drawn form – a circumstance that frustrated him. The presented phone allows for secretly communicating through a SMS-like chat under the table, in a minimalistic ‘poking’-style fashion – essentially, it would enable people to communicate through ‘Morse’ codes with their phones.

**Body Storming and Photo Stories**

The Body Storming the children engaged in were done under the assistance of the authors. One result (Fig. 3) was a secret communication device, which allowed for the transfer of a written message through a ‘magic wand’ throwing gesture. It is documented as a Photo Story showing the most important steps of the scenario and interaction. Another result (Fig. 4) was an authentication mechanism which worked similar to a ‘secret handshake’. The children were actively shaping the interaction principle while creating the photo stories. They were self-motivated in pursuing this activity.
DISCUSSION
The results presented above indicate that body storming was a suitable means of helping children in co-design processes to express their ideas. Compared to the drawn comics, the results from the photo stories exceeded in terms of novelty and applicability. Also, the children enjoyed the body storming creation more; as they were able to express their ideas quicker and in higher fidelity. One important factor was interacting with other children in the scenario, which led to a higher degree of expression and detail of the concepts. Furthermore, it was easier for the team of researchers to also engage in the co-design process as they directly could comment on certain ideas or ask leading questions within the process. Drawing pictures in the comic format showed to be quite abstract for the children as they had to visualize not only one scene, but a sequence of interactions. This involves much more reasoning and abstraction as one action follows in a logical order the other. To act this out on one own was much more intuitive for the children. In the end, the first hypothesis was confirmed: Acting as if the artifact would already exist and work helped the children to imagine how they would interact with it, and what alternatives to these ways of interaction would be. The second hypothesis did not hold to be true within the study presented. Also higher levels of complexity were easily managed by the children due to the playful context and synergies in the interaction amongst the group. One of our lessons learned was that the more freedom the children got and the more experimental and playful the context was, the better were the results. Triggering the imagination and creative expression of children was a suitable way to inspire visionary ideas and concepts.

CONCLUSION
For co-designing with children, we encourage the usage of embodied sketching techniques. Posing the interaction oneself can help in sparking further ideas, and creating photos can help children to communicate their concepts to each other. It appears sensible to foster expressive skills that children already possess: acting-as-if. Children may be creative in drawing, too, but the expressive quality of self-posed photo stories, as compared to the drawn comic stories, revealed itself to be superior.

OUTLOOK
Co-designing with children is a research field of great potential. As children are highly creative and usually enjoy creation under assistance, it may allow us to create innovative new ways of how we interact with technology. The StreetLab was an experiment that allowed us to work closely with children in innovation processes – in the field, rather than in the lab. We encourage further research in this area.

REFERENCES
10. Vaajakallio, K., Lee, J. and Mattelmäki, T., "It has to be a group work!": co-design with children. in IDC ’09: Proceedings of the 8th International Conference on Interaction Design and Children, (Como, Italy, 2009), ACM, 246-249.
11. Xu, D., Read, J., Sim, G. and McManus, B., Experience it, draw it, rate it: capture children's experiences with their drawings. in IDC '09: Proceedings of the 8th International Conference on Interaction Design and Children, (Como, Italy, 2009), ACM, 266-270.