

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].

Permission to make digital or hard copies of all or part of this work for personal or classroom use is granted without fee provided that copies are not made or distributed for profit or commercial advantage and that copies bear this notice and the full citation on the first page. To copy otherwise, or republish, to post on servers or to redistribute to lists, requires prior specific permission and/or a fee.

IDC 2010, June 9–12, 2010, Barcelona, Spain.

Copyright 2010 ACM 978-1-60558-951-0/10/06...\$10.00.

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 Peircian 'firstness, secondness and thirdness'. These two concepts seem to provide fruitful ground for the development of new physical, social devices.

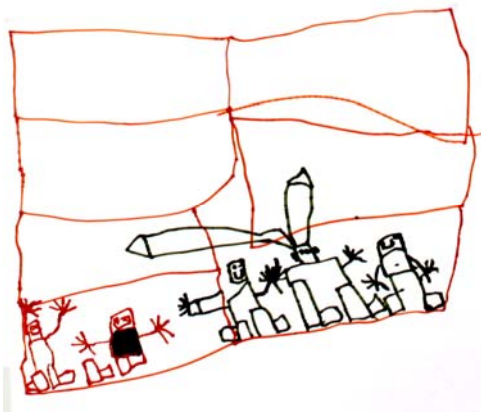


Fig. 1: Structural issues in image-sequence based, hand-drawn expression (8 years, male).

It appears that embodiment theory holds potential for classifications and selections among different co-design

strategies when working with children on tangibility-oriented, mobile communication devices, especially for the stage of practice in sketching involved. Its practical applicability has, however, not been adequately researched yet. The project reported in the following is an endeavor that attempts to take a first step into this direction, shedding light on how sketching with children can be done in a productive and fun way.



Fig. 2: Compositional issues in image-sequence based, hand-drawn expression (12 years, male).

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.

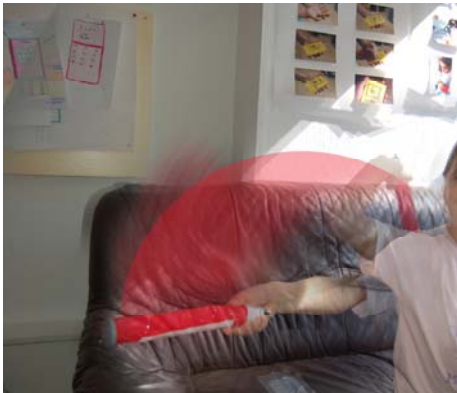


Fig. 3: A wand-like communication device.
(9 years, female).

USERS AND STUDY

In the study, six children (4f, 2m, aged 6-12) participated. All had a migration background and were living in Berlin-Neukölln. They were, in a simplified way, informed about the questions that were sought to be answered: They were instructed to invent a novel communication device for 'secret communication'. They were assisted in their creative processes by the authors of this paper, so there might be a bias in the observation of the process in terms of the likeliness of the hypothesis. The children were at first engaged in a bodystorming activity. Generally, the purpose of bodystorming is to develop and examine concepts quickly based on the respective context or user. People engaged in this exercise act out a scenario based on their imagination. They examine and concretize this scenario by role playing and observation of the intuitive actions and reactions – in which the body plays a major role. It is then aimed to integrate the results into design concepts. The bodystorming that the children were engaged in was documented in a photo-story, a process in which the authors of this paper assisted the children. This being a rather embodied style of sketching, the children were engaged in a second design process, solely through comic-drawings – a rather disembodied approach.

RESULTS

The results of the sketching experiment varied greatly, between applied methods, and between individual children. We will present a selection of results in the following, ordered by the level of embodiment involved during their creation phase.

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.

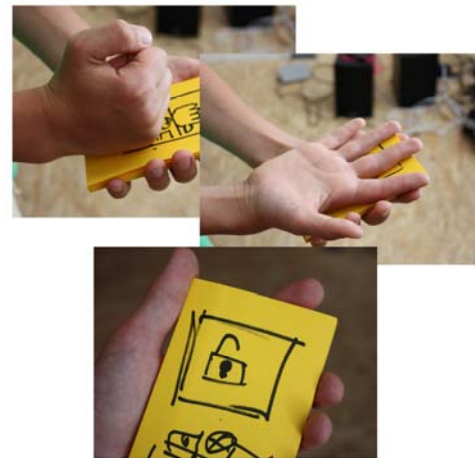


Fig. 4: Handshake authentication. (12 years, male).

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

1. Antle, A., Fernaeus, Y. and Marshall, P., Children and embodied interaction: seeking common ground. in *IDC '09: Proceedings of the 8th International Conference on Interaction Design and Children*, (Como, Italy, 2009), ACM, 306-308.
2. Arieievitch, I.M. and Haenen, J.P.P. Connecting sociocultural theory and educational practice: Galperin's approach. *Educ. Psychol.*, 40 (3). 155-165.
3. Dourish, P. *Where the Action Is: The Foundations of Embodied Interaction*. {The MIT Press}, 2001.
4. Johnson, G., Gross, M. and Do, E., Flow selection: a time-based selection and operation technique for sketching tools. in *AVI '06: Proceedings of the working conference on Advanced visual interfaces*, (2006), ACM, 83-86.
5. Jones, C., McIver, L., Gibson, L. and Gregor, P., Experiences obtained from designing with children. in *IDC '03: Proceedings of the 2003 conference on Interaction design and children*, (Preston, England, 2003), ACM, 69-74.
6. Klemmer, S., Hartmann, B., rn and Takayama, L., How bodies matter: five themes for interaction design. in *DIS '06: Proceedings of the 6th ACM conference on Designing Interactive systems*, (2006), ACM Press, 140-149.
7. Moraveji, N., Li, J., Ding, J., O'Kelley, P. and Woolf, S., Comicoboarding: using comics as proxies for participatory design with children. in *CHI '07: Proceedings of the SIGCHI conference on Human factors in computing systems*, (San Jose, California, USA, 2007), ACM, 1371-1374.
8. O'Neill, S. *Interactive Media: The Semiotics of Embodied Interaction*. Springer, 2008.
9. Polanyi, M. *The Tacit Dimension*. University of Chicago Press, 1967.
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.