
Effects of Participatory Evaluation – A Critical Actor-Network Analysis

Katta Spiel
Christopher Frauenberger
Geraldine Fitzpatrick
TU Wien
Vienna, Austria
katta@igw.tuwien.ac.at
christopher.frauenberger@tuwien.ac.at
geraldine.fitzpatrick@tuwien.ac.at

Eva Hornecker
Bauhaus-Universität Weimar
Weimar, Germany
eva.hornecker@uni-weimar.de

ABSTRACT

In previous work, we have developed the theoretical concept of Critical Experience and the Participatory Evaluation with Autistic ChildrEn (PEACE) method. We grounded both in a series of separate case studies which allowed us to understand how to gather more and richer insights from the children than previously. This is crucial for child-led research projects. In this paper, we present additional cases in more detail which demonstrate the applicability of our concept of Critical Experience on cases in which PEACE was used. This provides new insights into how Critical Experience handles child-led evaluation strategies and how it can be applied and potentially transferred to different contexts, guiding other researchers and practitioners in evaluating participatory processes.

CCS CONCEPTS

• **Human-centered computing** → **HCI design and evaluation methods**;

Permission to make digital or hard copies of part or all 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. Copyrights for third-party components of this work must be honored. For all other uses, contact the owner/author(s).

CHI'19 Extended Abstracts, May 4–9, 2019, Glasgow, Scotland, UK

© 2019 Copyright held by the owner/author(s).

ACM ISBN 978-1-4503-5971-9/19/05.

<https://doi.org/10.1145/3290607.3299049>

KEYWORDS

Participatory Evaluation; Actor-Network Analysis; Participatory Design; Autism; Children






ACM Reference Format:

Katta Spiel, Christopher Frauenberger, Geraldine Fitzpatrick, and Eva Hornecker. 2019. Effects of Participatory Evaluation – A Critical Actor-Network Analysis. In *CHI Conference on Human Factors in Computing Systems Extended Abstracts (CHI'19 Extended Abstracts)*, May 4–9, 2019, Glasgow, Scotland, UK. ACM, New York, NY, USA, 8 pages. <https://doi.org/10.1145/3290607.3299049>

INTRODUCTION AND METHOD

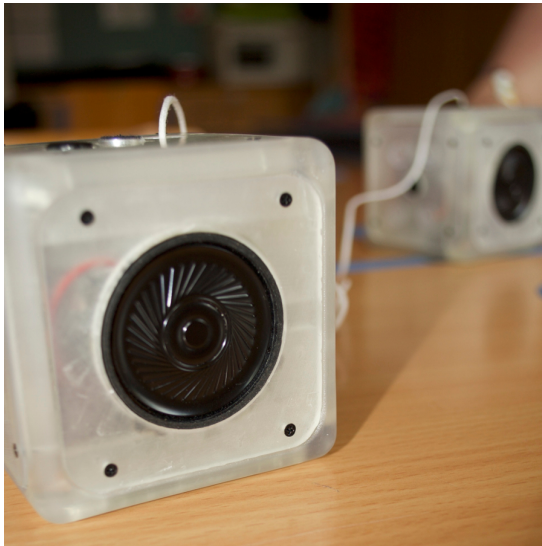
We present case studies from the OutsideTheBox project [4, 7] in which we co-created technologies with individual autistic children¹ that target their holistic well-being. The design processes built on the blending of a participatory design tool set [5] and are inherently child-led.

To analyse the children’s experiences with the technologies we co-created, we developed our own evaluation framework, based on the concept of Critical Experience [9], that aims to consider the larger socio-technical ecology [2] of the interaction through a Critical Actor-Network Analysis. The framework provides researchers with a structured step by step approach allowing them to move beyond empathetic engagements with their participants [10]. The steps of the analysis are as follows:

- | | |
|--|--|
| (1) Define Discourse and Context (Dispositive) |  |
| (2) Gather Data to Populate Actors and Relationships |  |
| (3) Analyse Data and Identify Statements |  |
| (4) Put Statements in Context to Each Other |  |
| (5) Rinse and Repeat |  |

Reflecting on the initial series of case studies we used to develop and ground the Critical Experience framework, we identified the need to develop a method that explicitly elevates the children’s agenda and their opinions in evaluating technological experiences [10]. This has led us to develop the Participatory Evaluation with Autistic ChildrEn (PEACE) method, which we applied in a second round of case studies within the OutsideTheBox project [11]. The PEACE method includes participants in meaning making of technology by performing three steps in a radically participatory way: 1) Setting Goals, 2) Gathering Data and 3) Interpreting Results. With this paper, we close the circle and present case studies from this second round in which PEACE has been applied, and analyse them through the Critical Experience framework. We thereby explore how the additional insights gained by using PEACE as an evaluation method can be handled conceptually within the framework and how in turn the framework may need to evolve.

¹We use identity first language to acknowledge the preferences of autistic self-advocates [8].



Sidebar 1: When we first met Quentin, he was nine years old and went to a mainstream school. He was diagnosed with Aspergers when he was in pre-school. Tinkering and crafting were well-loved activities, but only to create a finished object that has a use (even if it is not necessarily evident to outsiders). For our collaboration, we had an empty classroom around the corner from his classroom to our disposal. Two sessions were conducted in the university. The resulting object are the depicted sound cubes which allow people to record and share sound messages with each other.

FINDINGS

For our selected cases, we limit the presentation of our findings to selected steps of the process, each one (par Rinse & Repeat) illustrated through one of the cases. We engaged with the children in extensive collaboration cycles (up to 24 months).

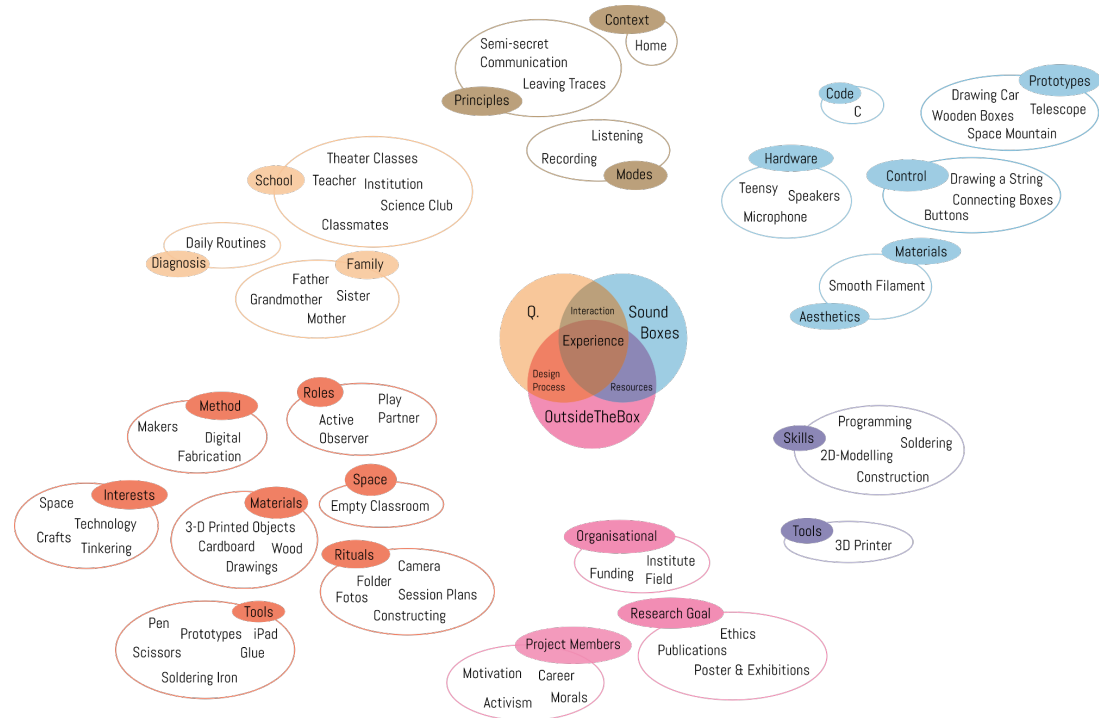


Figure 1: Actor-Network for Quentin's context

Quentin

Define Context and Discourse

Quentin's actor-network indicates that the school environment was much more present than in the other case studies. On the one hand, we conducted our sessions in an empty





Sidebar 2: Time Machine of Yvan and Hank

classroom, on the other hand, topics of other classes were continually present. Quentin disliked spending time in the theatre classes and often regarded our project as a treat if it led to him ‘getting out’ of theatre class. However, Science Club was one of his favourite activities, and often much more exciting than our collaboration, as it was not a longer-term engagement for one object, but defined projects which resulted in a single object that he could take home every time.

This competition with the Science Club led to our process (which was Maker inspired and following Digital Fabrication [6]) being guided by a series of prototypes, each one either exploring concepts or building on an aspect of the final object. Quentin kept all prototypes and showed them to his family at home. Considering how crafts, tinkering and technology are some of his core interests, the network shows that the method and the execution of the method through prototypes seemed to have been appropriate for that child. It additionally indicates how different aspects are differently relevant to different children and how a child-led design process within the same project can be actualised differently.

Contextualisation

Quentin found the project often to be lacking activities important to him. While we said we would take his interests serious, we never followed through on making a money-printing machine. Also, in Science Club, there was always a tangible reward at the end of the session, whereas in our case, the outcome was often intangible as an idea and only later, when we started more prototyping activities, he could similarly take intermediary objects home with him. He asserted himself in the process, which resulted in his case leading to one of the technologies, where the child was most involved in the final creation process. We observed how he proudly presented the final Sound Cubes (see Figure in Sidebar 1) to classmates. His teacher indicated that he re-appropriated the boxes long after the project ended. He constantly shifted the meaning and use of them until they were entirely non-functional. Hence, in his case, the final object was more relevant than the design process—or functioned as an extenuation of said process.



Yvan & Hank

After working for about a year with Yvan alone, his brother Hank joined the project for the second year, which is the process we focus on in this case study. We co-developed a Time Machine (see Sidebar 2), a lamp with a smart light that can be controlled by moving, shaking and positioning two control elements; one for each brother. They used the technology to immerse themselves in a narrative around space travel and exploration.

Gather Data

Since the sessions with both children were most often conducted in the open space within the family business, most of the video recordings we attempted to make did not cover everything in a given session. Hence, researcher diaries and photos the children made were





Sidebar 3: Drawing of Interaction with Time Machine

core data sources from different perspectives for the process. Additionally, we conducted interviews with parents and—tangentially—with the children themselves. Additionally, the children created drawings about their feelings surrounding the interaction with the time machine (see Figure in Sidebar 3). Unfortunately, we could not inquire into the object directly as we had no access to it anymore after handing it over.

Contextualisation

The created objects needed to reflect both children’s interests and needs. Hank often felt he was not taken as seriously as his brother because he was younger and knew us (and the things we did) for a shorter time frame than him. Hence, it was paramount to the design of the object and, eventually, as a lens for evaluation to ensure equal access, participation and opportunities to engage for both children. From our data we see a conflict between the children which is mostly fuelled by Hank feeling that his needs are less important than those of Yvan. For example, Hank associates Yvan’s favourite colour, red, with ‘danger’. It was then important to us to ensure that the object would allow the children to engage with their conflicts constructively. Lastly, both children were also quite active, spurring ideas, exploring their environments, spinning stories but also experimenting with objects roughly and testing their limits. Hence, we had to ensure the final prototypes would be robust enough for the children.



Oliver

We collaborated with Oliver for more than a year, and during that time, he transitioned from a specialised pre-school to an integrative primary school. The resulting technology from this process, called Öxe, consists of a light table that can create different patterns, which can be created by placing different tokens on a receptor or appear randomly according to different modes (see also figure in Sidebar 4).

Analyse Data and Identify Statements

In Table 1 we present a selection of statements by the three actors we consulted the most about the experience: teachers, Oliver and object speculation [1] on Öxe. Across the three actors, we received very different statements which are differently contextualised and also speak of what is most important about the experience to a single actor. Hence, this shows again, how using Critical Experience can guide a process aiming at capturing multiple perspectives, which then can help to to establish a more holistic view on the experiences an autistic child might have with an object.



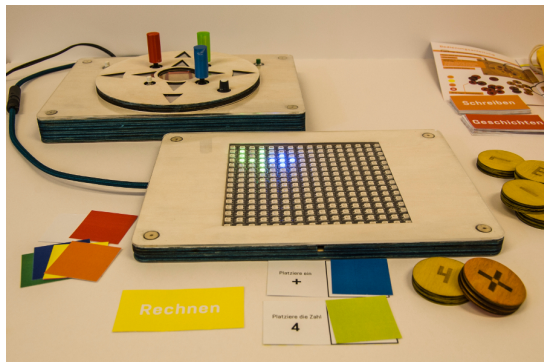
Contextualise Statements

While the teacher focused on how the Light Table related to the educational context and how it can ultimately be useful to her, Oliver expressed pride and joy when talking about or interacting with the Light Table. Interestingly enough, communicating via smileys (sad



Actor	Statements	Source
Teacher	Oliver urges us to use the Light Table in class. The Light Table motivates our students to engage with numbers and letters.	interviews
Oliver	I made this. I can show you how it works. :)	PEACE observations
Light Table	My energy cable is missing. The children have access to me, but it's hidden.	object speculation

Table 1: Selection of statements identified in Oliver's Sociotechnical context



Sidebar 4: Oliver's Light Table, Öxe, with which Oliver can move the drawings on the table, animate them and undo previous steps. Additionally, there are tokens to create numbers, letters and animals on the light table.

or happy) has been so important for him to give feedback that we decided, it was his statement in the end. The location of the table (in a box within the classroom) allows the children to reach it, but usage traces on the surface of the object indicate that this is rarely the case. It might be that the teacher feels responsible to facilitate the interaction with the Light Table as its use within educational contexts seems logical. Hence, Oliver might ultimately face limitations on access to the object and, subsequently, have less opportunities to experience it. In summary, it seems that Oliver's experience with the Light Table is associated with pride and the exhibition of knowledge, but also very much rooted in a school context with the associated experiences that frame his education.

DISCUSSION

We now discuss the implications of these findings along what they indicate for the children's experiences as well as what they mean for the methods employed (see also Sidebar 5).

Children's Experience

Each case showed that the individual lifeworlds and the subsequent individual technologies addressing them also resulted in situated individual experiences that unfolded between children and technology in use.

Quentin showed continued engagement with the objects themselves, even though he was less emotionally involved in the design process. He showed a strong interest in the final product, but finds the process of creating them and solving problems less rewarding – at least as a group exercise. During the process, he was always inspired by the objects around him, but was also quickly bored,

Case	Experience
Quentin	Focused on final objects
Yvan & Hank	Mediated engagement
Oliver	Achievement in design process
Case	Methodological Insight
Quentin	Limited data yields meaningful knowledge
Yvan & Hank	Careful navigation of differing needs
Oliver	Statements go beyond language

Sidebar 5: Overview of Insights

mainly when a session did not result in a finished artefact. When he had full control over the Sound Cubes, he took ownership of them through constant engagement and improvement.

The Time Machine facilitated a collaborative experience which gave Yvan an environment in which his specialised knowledge would be appreciated. He could engage with others on his own terms. His brother Hank was an essential part in this experience, but also struggled with Yvan's demands. However, they had defined their roles in interacting with the Time Machine explicitly, giving Hank the steering wheel and the commando to decide where they would go and allowing Yvan to tailor the story around that decision. Hence, it also allowed them to subvert hierarchical tendencies they established in other interactions with each other. Hank gained a sense of control and Yvan's need for discussing his interests were met as well.

Oliver exhibited pride and a sense of achievement in his co-creation when showing it to others. When he suggests interacting with it, he feels a sense of control and engages with rewards at his own pace. The Light Table allows the self-guided exploration of learning goals and educational games.

Overall, the children expressed a sense of pride when conceptualising themselves as co-designers of technologies. While the design process was a core part around framing the children's experiences, the resulting technology provided enjoyable experiences on its own.

Methodological Insights

Across the cases, we can see the children's first-person perspective reflected in more depth as can be seen by them taking up more space in the statements table (see Table 1) than was the case for previous analyses [10]. Each case provided a different angle for methodological insights for the concept.

Quentin's case constitutes the one with the most limited data set. On the one hand, it is difficult to judge scientific rigour in the actor-network as the data sources themselves are not part of it. On the other hand, we can also see that we still learn about influencing actors even if we are not able to inquire about them directly—as was the case for evaluation when we only had access to the teacher. We can still capture the complexity of the experiences autistic children have with technology and the uniqueness and situatedness for each case, though, by inquiring into a range of perspectives.

In analysing the evaluation process for Yvan and Hank, we could show that different needs need to be navigated carefully. Additionally, it illustrates how relevant structured evaluation can be in design. Through engaging with the form of evaluation we did, previous designs could be refined and improved for the final prototype.

Finally, with Oliver, it became apparent just how crucial it is to gain an understanding of statements beyond words. The smiley was an expressive statement for him that he used to give positive and negative feedback. While the academic process often requires researchers to illustrate their findings through words, it is paramount in working with participants who might have different modes of communication to find creative ways to interpret their communication appropriately (see also, [3]).

CONCLUSION

In this case study, we have applied the concept of Critical Experience [9] on a series of case studies from the OutsideTheBox project after introducing participatory evaluation [11]. We reflected on differences to previously gathered insights using the same method [10]. We found that doing so we acquired richer data from the children’s perspective informing our analysis. We plan to investigate multiple options for the development of the Critical Experience Framework – also with other audiences, e.g., seniors, and research interests, e.g., classical usability studies. Our work shows how the concept can be used outside of the case studies it has been grounded in, which aids demonstrating its suitability to illustrate technological experiences from multiple perspectives more generally.

REFERENCES

- [1] Ian Bogost. 2012. *Alien phenomenology, or, what it’s like to be a thing*. U of Minnesota Press.
- [2] Jodi Forlizzi, Carl DiSalvo, and Francine Gemperle. 2004. Assistive Robotics and an Ecology of Elders Living Independently in Their Homes. *Hum.-Comput. Interact.* 19, 1 (June 2004), 25–59. https://doi.org/10.1207/s15327051hci1901&2_3
- [3] Christopher Frauenberger, Judith Good, Wendy Keay-Bright, and Helen Pain. 2012. Interpreting Input from Children: A Designerly Approach. In *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems (CHI ’12)*. ACM, New York, NY, USA, 2377–2386. <https://doi.org/10.1145/2207676.2208399>
- [4] Christopher Frauenberger, Julia Makhaeva, and Katta Spiel. 2016. Designing Smart Objects with Autistic Children: Four Design Exposés. In *Proceedings of the 2016 CHI Conference on Human Factors in Computing Systems (CHI ’16)*. ACM, New York, NY, USA, 130–139. <https://doi.org/10.1145/2858036.2858050>
- [5] Christopher Frauenberger, Julia Makhaeva, and Katta Spiel. 2017. Blending Methods: Developing Participatory Design Sessions for Autistic Children. In *Proceedings of the 2017 Conference on Interaction Design and Children (IDC ’17)*. ACM, New York, NY, USA, 39–49. <https://doi.org/10.1145/3078072.3079727>
- [6] Christopher Frauenberger and Irene Posch. 2014. Exploring Future Technologies Through Digital Fabrication With Autistic Children. In *Participatory Design in Digital Fabrication workshop at FabLearn’14*. FabLearn’14, Stanford, CA, USA, Article 1, 4 pages. <http://outsidethebox.at/files/fabwithasd.pdf>
- [7] Christopher Frauenberger, Katta Spiel, and Julia Makhaeva. 2018. Thinking OutsideTheBox - Designing Smart Things with Autistic Children. *International Journal of Human-Computer Interaction* 0, 0 (2018), 1–13. <https://doi.org/10.1080/10447318.2018.1550177> arXiv:<https://doi.org/10.1080/10447318.2018.1550177>
- [8] Jim Sinclair. 2013. Why I dislike “person first” Language. *Autonomy, the Critical Journal of Interdisciplinary Autism Studies* 1, 2 (2013). <http://www.larry-arnold.net/Autonomy/index.php/autonomy/article/view/OP1>
- [9] Katta Spiel, Christopher Frauenberger, and Geraldine Fitzpatrick. 2017. Experiences of autistic children with technologies. *International Journal of Child-Computer Interaction* 11 (2017), 50–61. Issue Supplement C. <https://doi.org/10.1016/j.ijcci.2016.10.007>
- [10] Katta Spiel, Christopher Frauenberger, Eva Hornecker, and Geraldine Fitzpatrick. 2017. When Empathy Is Not Enough: Assessing the Experiences of Autistic Children with Technologies. In *Proceedings of the 2017 CHI Conference on Human Factors in Computing Systems (CHI ’17)*. ACM, New York, NY, USA, 2853–2864. <https://doi.org/10.1145/3025453.3025785>
- [11] Katta Spiel, Laura Malinverni, Judith Good, and Christopher Frauenberger. 2017. Participatory Evaluation with Autistic Children. In *Proceedings of the 2017 CHI Conference on Human Factors in Computing Systems (CHI ’17)*. ACM, New York, NY, USA, 5755–5766. <https://doi.org/10.1145/3025453.3025851>