
Electronic digital music practice for neurodiverse people: a work in progress

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Abstract

The DEIND project presented in this extended abstract is an attempt to connect neurodiverse people with the field of contemporary electronic and digital music practice.

In pursuit of this, people with autistic spectrum disorders are invited to take part in the design process of electronic instruments. In difference to music therapy approaches, focus of the presented research lies in the design of tools and methods for artistic expression rather than therapeutic outcome. The close integration of target group members into the research process encourages a bilateral learning process: on the one hand, there is an intense and fruitful experience for the participants. On the other hand, involved researchers can identify design challenges specific to the target group and reveal new perspectives on their respective area of research.

Keywords

electronic music practice, autistic spectrum disorder, artistic expression

ACM Classification Keywords

J.5 ARTS AND HUMANITIES: Music / Performing arts, K.4.2 COMPUTERS AND SOCIETY: Social Issues – Assistive technologies for persons with disabilities, J.4 SOCIAL AND BEHAVIORAL SCIENCES

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Motivation

As a consequence of recent technological and cultural developments – cheap electronics, rapid prototyping technologies, freely available information – the majority of people in the western world are able to express themselves creatively with technology in a multitude of ways without the large investment of time or money that would have been traditionally necessary. This has manifested itself in the birth of the DIY, maker and demo scenes.

People with disabilities however, often lack the possibility to take part in such cutting-edge movements.¹ This is because the necessary assistive features and design considerations are often of secondary interest to the designers and developers of the required technology. This problem is exacerbated further when it comes to the facilitation of participation in cultural niches².

However, questions remain on how, for example, electronic music practice (*EMP*) can be scaffolded to support people facing challenges in society due to differences in their neurologic development: How can *EMP* support them in expressing themselves beyond the mainstream? How can it make the engaging nature of *EMP* accessible for them without providing too much guidance? Can *EMP* empower them to shape their own social niche(s) in the above-mentioned sense?

This paper gives an overview on how the DEIND project, which aims to connect neurodiverse (*ND*) people with the field of contemporary electronic and digital music practice, approaches these questions. In pursuit of this, people with autistic spectrum disorders are invited to participate in the design process of electronic musical instruments. In difference to music therapy approaches, focus of the presented research lies in the design of tools and methods for artistic expression rather than its utilisation in a therapeutic sense [1].

¹Although freedom of artistic expression is seen as a human right [7].

²This is not due to bad faith on the part of the designers, but merely lack of information or resources.

We therefore believe that the consideration of artistic expression is a valuable purpose of musical practice and unfolds the span of meaning of music practice for people with special needs beyond aspects of entertainment and therapy (see Figure 1).

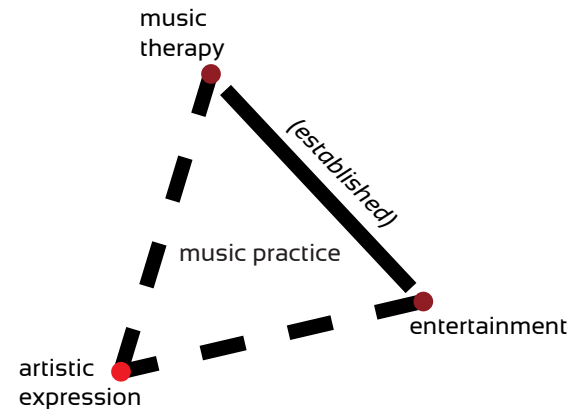


Figure 1: Considering artistic expression as a true purpose of musical practice unfolds and supports the span of meaning in music practice of people with special needs.

To facilitate music practice, we aim for a holistic instrument experience rather than a modular approach in which the underlying modules of electronic instruments, interface & mapping & sound synthesis, would become too evident and possibly interfere with the flow experience. We hope that the integration of target group members into the design cycle encourages a bilateral learning process. An intense and fruitful experience for the participants is complemented by the circumstance that the involved researchers are able to identify challenges that are specific to this group, yet also reveal new perspectives on their respective research area.

In the next section, we further outline the research hypothesis and thereof arising questions. This is followed by a section giving a short overview on used research methods followed by a section reporting on the state of the project five months after its start. The paper concludes with a section on first insights and an outlook on further development.

Research hypothesis

The central hypothesis that this project examines can be broken down to the following sentence: *Making the field of electronic music practice accessible to ND people empowers them to actively participate in an area that, after Headlam [4], already paralleled specifics of ND thinking.* Out of this hypothesis, four questions arise that we want to answer over the course of the project:

1. Which aspects of electronic music are sufficiently interesting for the target group?
2. In which sense does the active engagement with electronic music affect the aesthetic perception of target group members?
3. In which direction do people of the target group develop their skills in electronic music making over the course of the project?
4. What can we learn from people with autistic spectrum disorders when it comes to non-verbal communication, creativity and music practice?

Implementation and research methods

We investigate the above-mentioned research questions through three work packages (see also Figure 2). The first work package (WP1) is dedicated to investigative field work with target group members and the collection of

data. Interactive participatory design sessions are conducted in which the participants are introduced to contemporary electronic music and (later on) to instrument prototypes. A particular focus lies on open engagement with said instruments, providing an opportunity to explore and express. During these sessions, the musical play is recorded and various other research material such as drawings, written comments and interviews of all involved people are collected.

In the second work package (WP2) the focus is set on data evaluation, coding and theory building. The material gathered in WP1 is analysed and put into a broader context by incorporating knowledge gained from background research. This will eventually lead towards a theory of electronic music practice for ND people.

WP3, the third work package, deals with *conceptual synthesis* and instrument development; it aims to turn observations and derived theory made in WP1 and WP2 into practice by (a) rethinking the made theoretical considerations as practical guidelines and (b) creating instrument prototypes that are again used for the field work of WP1.

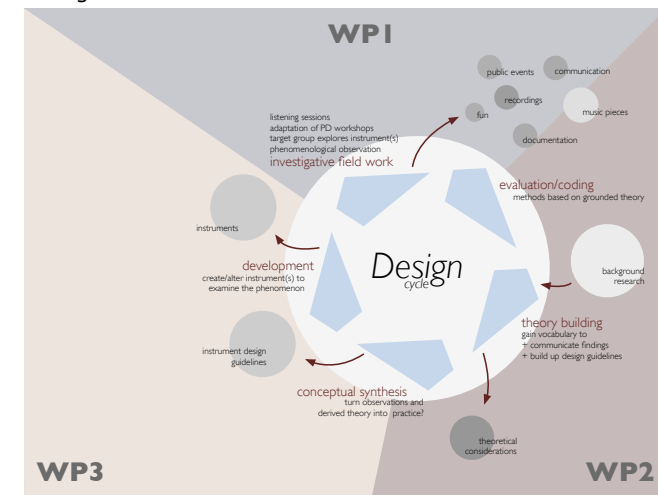


Figure 2: A structural overview of the design cycle showing interrelations of the WPs.

This project is mainly based on practice-oriented qualitative research methods [9]. We extensively draw from participatory design and ethnomethodological research methods adapted to the target groups' intrinsic character [6, 8]. To fulfil the above-listed objectives, we apply a combination of experimental and theoretical methods that are based on both artistic and scientific research practices. These include (a) phenomenological observations of target group members exploring musical possibilities of instruments resulting in interviews, field notes and quantitative measurements, (b) grounded theory and phenomenological analysis based on recorded research material combined with background research in related fields and (c) rapid software and hardware prototyping. By their combination, new knowledge for specific electronic instruments are gained, generalised and finally fed back into the respective research areas. The next section gives an overview on the ongoing research incorporating mentioned research methods.

DEIND – A work in progress

At the current state, the project made almost a full iteration in the design cycle (see Figure 2). It started with a kick-off meeting with all contributing members, followed by a day trip to Nuorten Ystävät's supervised living centre *VillaKarelia* in Imatra, Finland where our target group members reside. In the following workshop day, we discussed arising challenges and possible ideas for the system design which were eventually sorted and selected for the subsequent instrument prototyping.

After finishing the prototypes, a five-day field trip to *VillaKarelia* was undertaken. Its main purpose was to take part in the daily routines of the target group members. Initial

ideas on where digital music practice could fit into the highly structured days emerged during the stay, resulting in first listening sessions based around interactive ambient soundscapes. To date, the documentation material is partially analysed and will be reported in more detail in the short presentation at the conference.

Instrument prototyping

After the first one-day workshop, design and development of two of the many ideas was undertaken. Informed by observations made by Headlam on the interrelation of contemporary music and thinking processes of people with autistic spectrum disorder [4] as well as by texts and videos made and published by people with autistic spectrum disorder themselves³, the sonic focus of our designs was mainly on pattern-based rhythmical structures and the amplification of the existing soundscape within the performance space.

Based on findings made by Fard et al. [3], the interface and sensor prototyping concentrated on textile-based artefacts. Initial designs utilise custom-made sensor elements such as capacitive sensors and stroke-sensitive areas made of resistive yarn (see Figure 3).



Figure 3: Interface designs utilising custom-made sensor elements such as stroke-sensitive areas made of resistive yarn (left) and capacitive sensors inside of crocheted tubes (right).

³see e.g. works by Baggs [2]

First insights

As this paper reports on work in progress after five months of work on the DEIND project, unfortunately, detailed information based on data analysis cannot be given at this state. However, it is planned to give an overview on the results in the short talk at the conference. In general it can be noted that especially the sonic prototypes were well received by the target group, it was reported by the carers that study participants enjoyed the sessions a lot.

Conclusion and Outlook

This paper outlined the DEIND project in which research on electronic music practice for neurodiverse people is conducted. Based on the ongoing data analysis, we plan to continue this project and develop an interactive performance system that is closely adapted to target group's environment and their specific needs.

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