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

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**Abstract**

This paper gives an overview of the DEIND project. DEIND 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.

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**

Keywords go here.

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H.5.2 Information Interfaces and Presentation: User interfaces – Evaluation/ methodology

## 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.<sup>1</sup> 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 niches<sup>2</sup>.

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. 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.

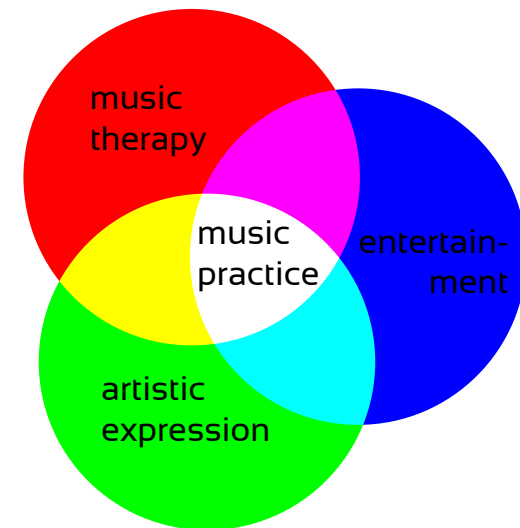


Figure 1: Considering artistic expression as a true purpose of musical practice unfolds and supports the span of meaning in music practice of people with special needs.

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 will outline the research hypothesis and thereof arising questions. This is followed by a section

<sup>1</sup>Although freedom of artistic expression is seen as a human right [24].

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

giving a short overview on used research methods. The subsequent section tells about the state of the project to date and reports on the ongoing development in the involved research areas. This is followed by a short description of the first field trip and its initial results. 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 [13], 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.

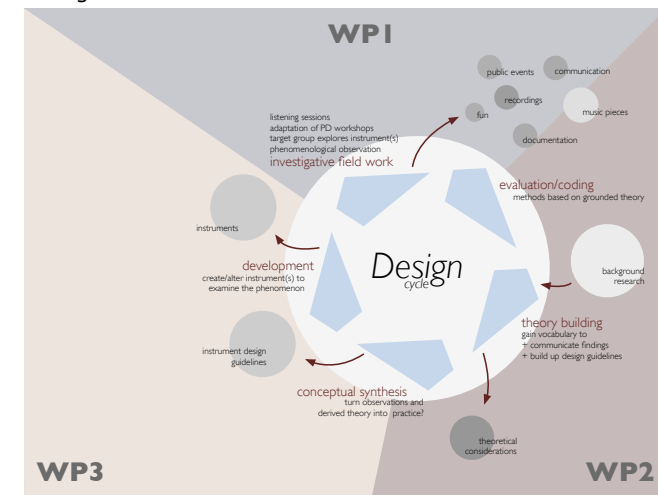


Figure 2: A structural overview of the design cycle showing interrelations of the WPs.

This project is mainly based on practice-oriented qualitative research methods [28]. We extensively draw from participatory design and ethnomethodological research methods adapted to the target groups' intrinsic character [23, 27]. 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 cycle in the design cycle. It started with a kick-off meeting with all contributing members, followed by a day trip to Nuorten Ystävät's supervised living center *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 be fit into the highly structured days emerged during the stay, resulting in

first sessions with interactive ambient soundscapes. To date, the documentation material is partially analysed and will be reported in more detail in the short presentation.

### Instrument prototyping

We decided to develop two of the many ideas further, namely the rhythmical interaction part and the idea on room modes.

### Audio prototyping

Reports on the two to seventeen audio prototypes we did: the ambient system (complexRes), the FM matrix, the autoLoopPointer, the diodeRing, the noiseRing

### Sensor prototyping

reports on the different sensors we looked at, e.g. switchDesigns (floor plan, imatra map)

### Interface prototyping

Mentions (again) that we're focusing mainly on textile-based interfaces. Why is that so? We have some knowledge and want to extend it. Because textiles are nice to touch, give a lot of haptic feedback and are easily accepted (when showing the prototypes to people, they immediately grasp for them and hug them. Happened for real!) We did an initial interface design with *conductive fur*. We describe conductive fur, how we anticipated its usage, how it feels and how it works. We as well give sound examples on how it sounds with and without added effects.

### Sonic environments

Contact microphone attached to the ventilation outlet to capture its vibrations. FM synthesis

## Field trip

### Data analysis and first insights

This is a work in progress paper, more detailed information on the data analysis will be given in the short talk/poster.

First

Describes what can be observed in the video session with participant 1 (rhythmical patterns). Look at notes made in Imatra and report those as general observations.

oh my. so many lessons learned. e.g. slowness, security, etc.

## Conclusion and Outlook

This paper outlined the DEIND project in which research on electronic music practice for neurodiverse people is conducted. After a motivation for this work and an overview on the work done so far, initial insights were presented. Based on these insights, 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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