

electronic music practice for people with ASD

scaffolding contemporary electronic music practice
for people with autistic spectrum disorder

till bovermann, 2013

medialab helsinki, department of media, aalto university



till bovermann

- + mediaLab, Aalto University, Helsinki
- + post-doctoral researcher in IxD and tangible auditory interfaces
- + PhD in computer science with focus on sonification
- + runs the TAI studio, a space for work on tangible and auditory interaction



introduction

What is Autism?

Autism spectrum disorder (ASD) and autism are both general terms for a group of complex disorders of brain development. These disorders are characterized, in varying degrees, by difficulties in social interaction, verbal and nonverbal communication and repetitive behaviors.

[...] Each individual with autism is unique.

[<http://www.autismspeaks.org/what-autism>, 9.6.2013]

What is Neurodiversity?

Neurodiversity is an approach to learning and disability which suggests that diverse neurological conditions appear as a result of normal variations in the human genome. This term was coined in the late 1990s as a challenge to prevailing views of neurological diversity as inherently pathological, and it asserts that neurological differences should be recognized and respected as a social category on a par with gender, ethnicity, sexual orientation, or disability status.

[<http://en.wikipedia.org/wiki/Neurodiversity>, 9.6.2013]

target group

cooperation partner Nuorten Ystävät

- + operates a supervised accomodation in eastern finland,
- + hosting 15 people with severe types of ASD
- + of which three are participants in our study



[photo by <http://www.nuortenystavat.fi>]



project intentions

- + connect people with ASD with the field of contemporary electronic and digital music practice
i.e. invite them to take part in the design process of electronic instruments for improvising
- + look at electronic instruments their usage and design from a non-standard point of view
i.e. derive more general insights for the involved disciplines
- + experience the diversity in thought processes
gather insights on instrument design for people with ASD

artistic freedom

Many people with ASD depend on external help to manage their daily living. However, life does not stop at its facilitation. Being able to express feelings and emotions by actively partaking in cultural activities is crucial, not only to express emotions but also to give others a chance to listen.

The issue of artistic freedom is crucial to any nation. It is not 'just' about the artists' rights to express themselves freely, it is also a question of the rights of citizens to access artistic expressions and take part in cultural life – and thus one of the key issues for democracy.

The protection of artistic expression is just as important for the development of democracy as the protection of media workers. It is frequently artists who – through music, visual arts or films – put the 'needle in the eye' and strike a chord with millions of people, some of them unable to read and with no access to express themselves.

[2013, Ole Reitov]

(Ole Reitov is the program manager of *Freemuse – The World Forum On music & Censorship* and consultant to the UN Human Rights Council for the 2013 report on the right to artistic expression and creation)

the right for artistic freedom

... does not stop at mainstream culture.

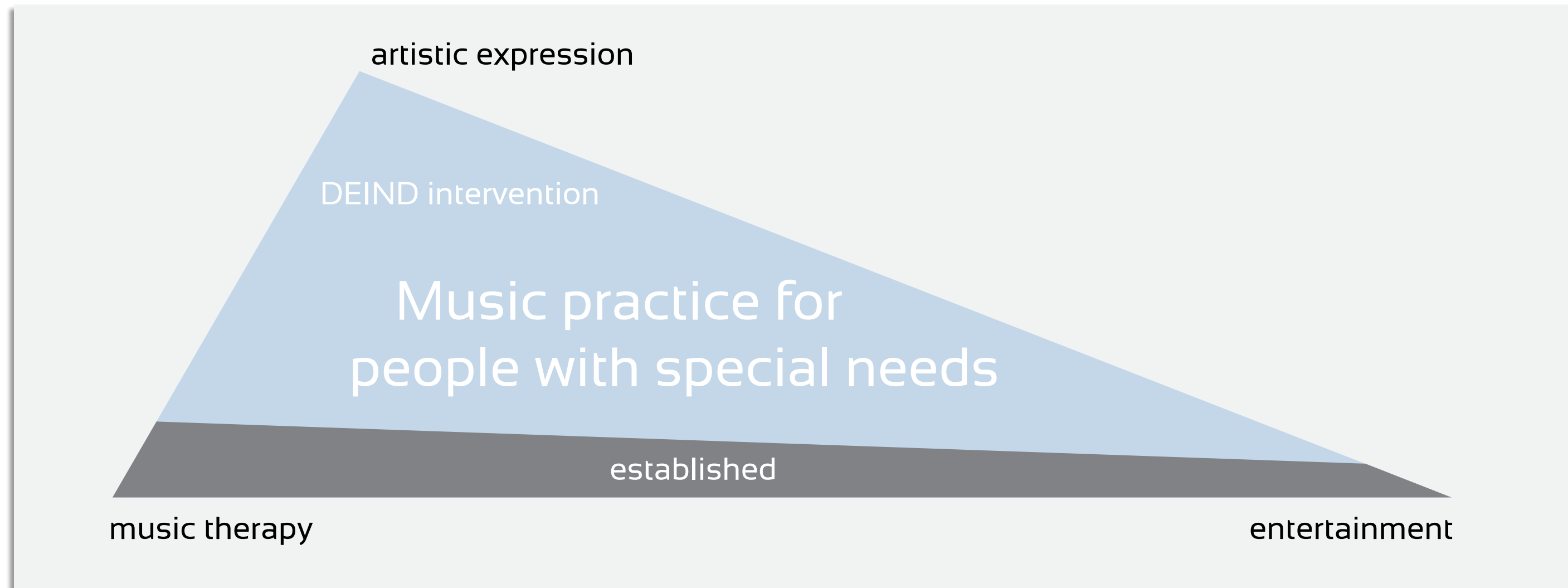
it remains its validity for niche fields such as contemporary music.

After Headlam, contemporary music already adopted specifics of ND thinking

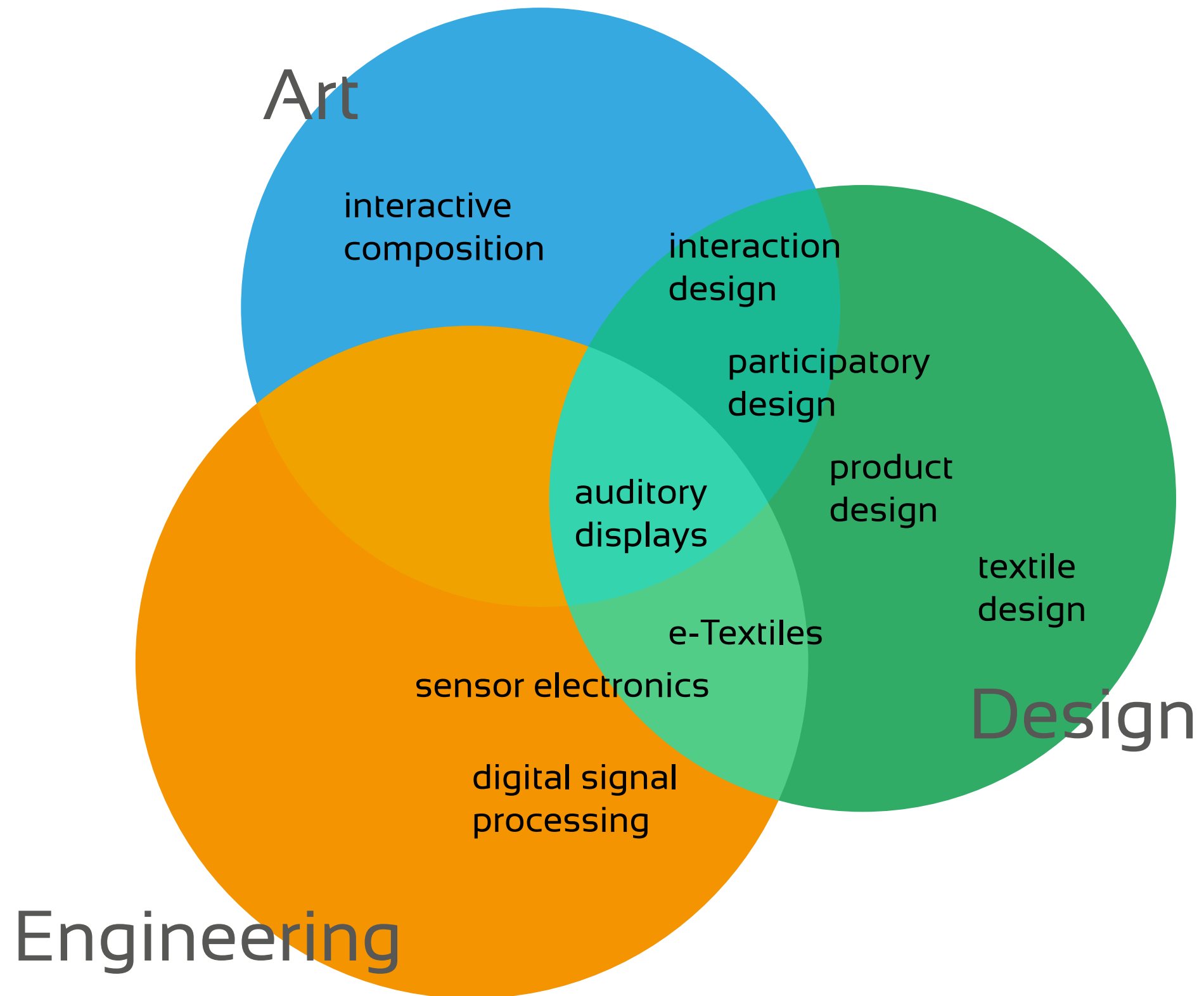
I show that autistics hear and conceive of music in distinctive ways that differ significantly from the ways in which music is heard and understood by people who are neurologically typical (NT). I suggest that [...] learning to “hear autistically” [...] may be particularly revealing when applied to nontonal music of the last one hundred or so years. This music has many aspects related to autistic characteristics [...].

[Headlam, D. (2006). *Learning to Hear Autistically*]

functions of music practice in the context of ASD



research disciplines



faces



Till Bovermann
computer science, sound, IxD, ...

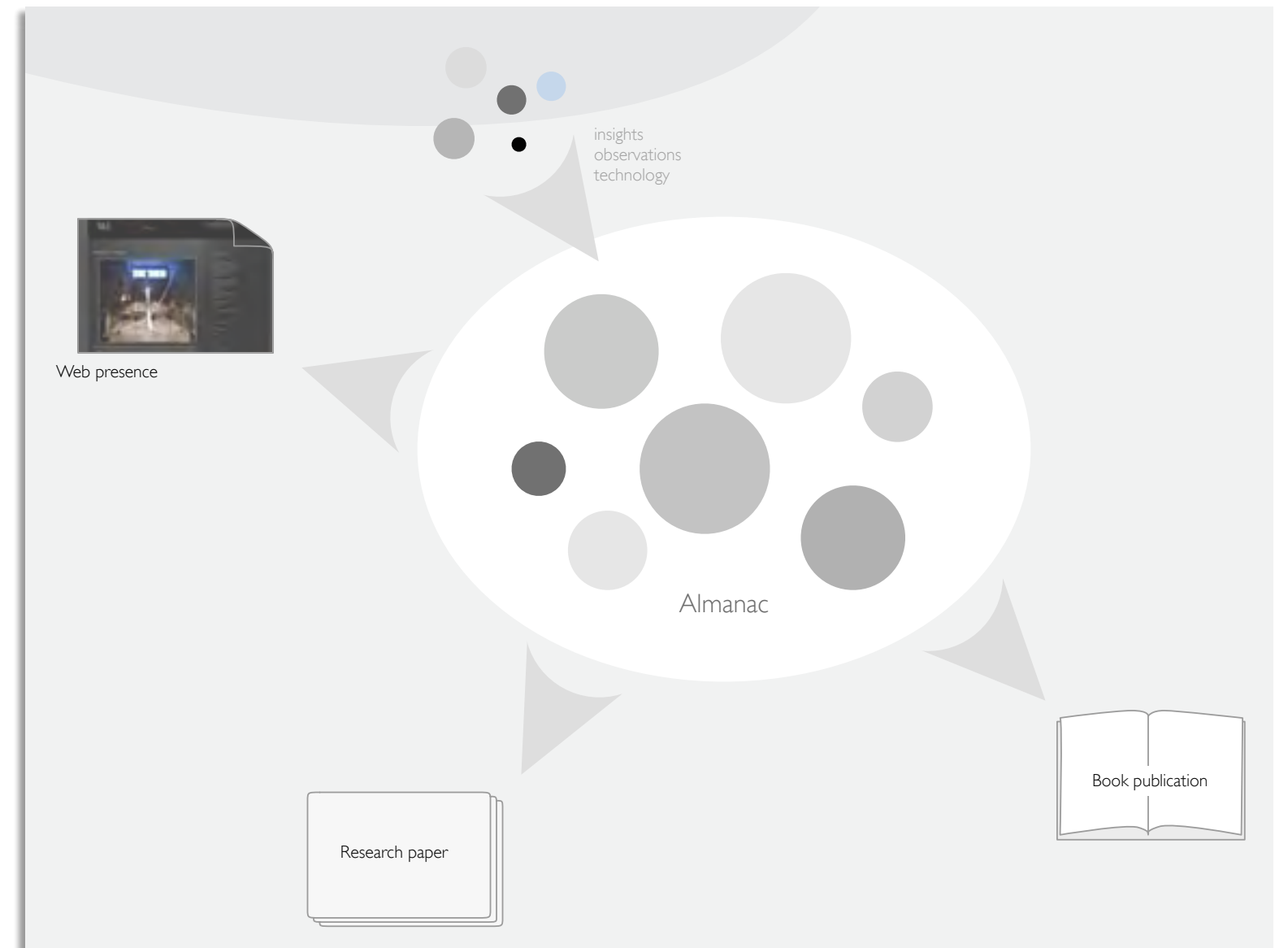
Mila Moisio
fashion, set design, ...

Julian Parker
dsp, sound, music, ...

Ramyah Gowrishankar
IxD, e-textile, ...

intended results

- + **instrument prototypes**
evaluated and real-life tested
- + **design guidelines**
how to design and build interactive electronic instruments for people with ASD, generalising to other target groups
- + **performances**
personal experiences (performer only) / selected audience / public distribution of recordings
- + **spin-off implementations and research**
in elated disciplines



methods

+ fieldwork

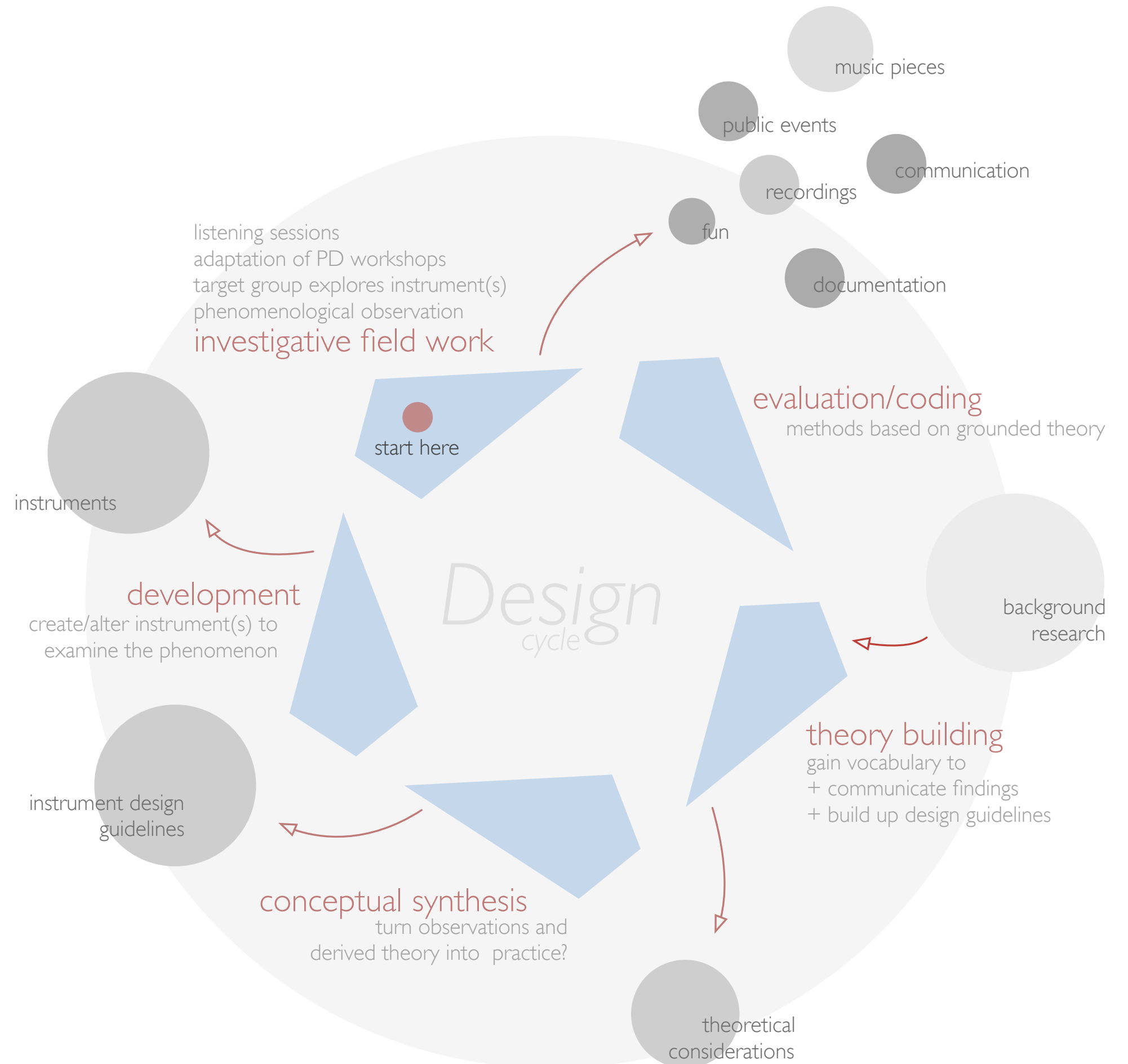
based on participatory design, adapted to target group's specific needs

+ grounded research

evaluation / coding / theory building

+ fabbing

rapid prototyping with e-embroidery / e-textile / electronics / sound setups

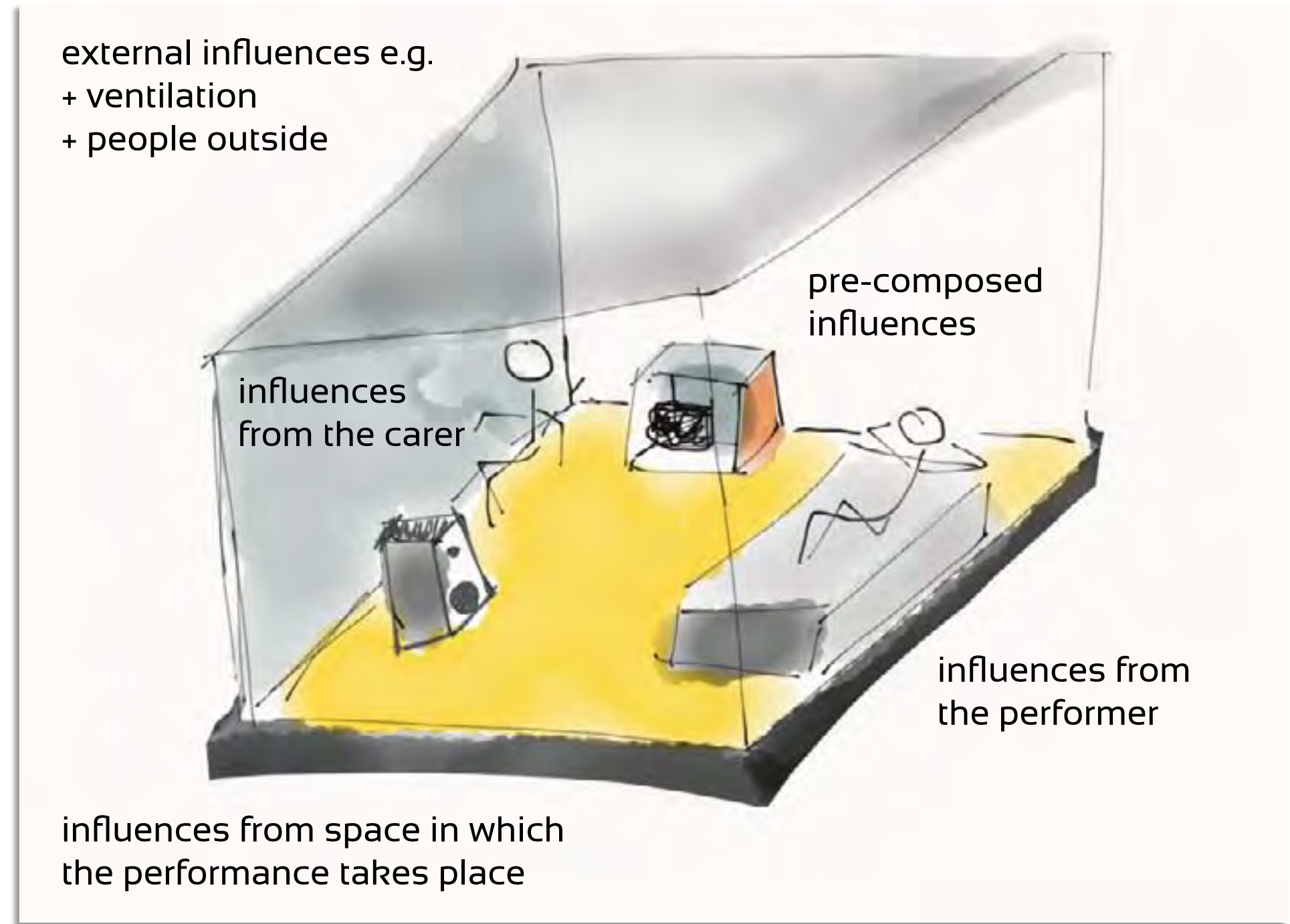


project status

kickoff phase

- + joint visit of VillaKarelia in late January
- + 2-day internal workshop
 - + design and development of instrument prototypes
- + 5-day field trip (I) — *listening sessions*
 - + inspection of gathered material
 - + design and development of instrument prototypes
- + 5-day field trip (II) — *soundscape interventions*
 - + inspection of gathered material
 - + instrument prototypes
- + 5-day field trip (III) — *interaction prototypes*

aistihuone – thinking the space



iteration 1

genres – thinking the music

possible genres are listed e.g. by Demers:

I consider a few genres selectively, including musique concrète, post-Schaefferian electroacoustic music, techno, house, microsound, glitch, ambient, drone, dub techno, noise, chill-out, soundscape, and field recording.

[Demers, 2010]

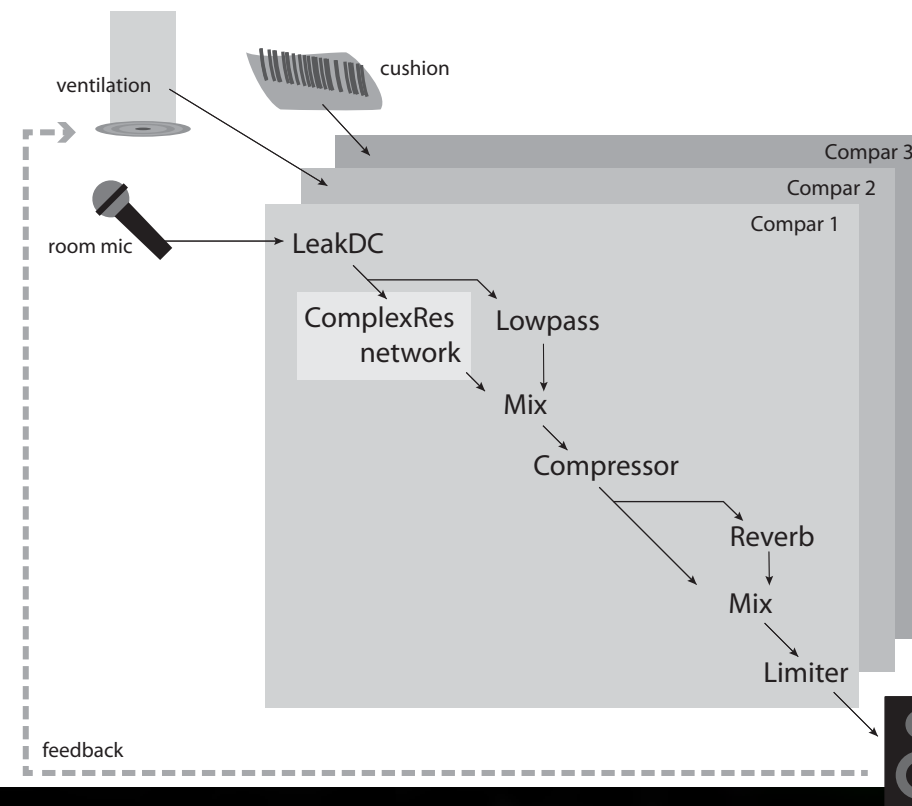
Listening through the noise: the aesthetics of experimental electronic music

Listening sessions in first iteration included works by

- + Thomas Köner
ambient noise
- + Signal (Frank Bretschneider, Carsten Nicolai)
noise/glitch
- + Kangding Ray
techno/pop
- + Thomas Ankersmit
noise
- + Wu-Na (暮良文王)
electroacoustic, gu-seng
- + Steve Reich
electroacoustic, pattern-based
- + Karlheinz Essl
electroacoustic, pattern-based

prototyping – audio

complex resonator / ring modulator / FM feedback matrix / feedback sounds

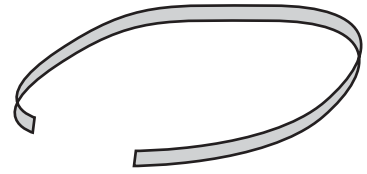


preAmp		1
postAmp		0.04
dryAmp		0.9
filterWet		888.47
reverbWet		373.04
freq0		888.47
freq1		1
freq2		0.99
amp0		1
amp1		5979.3
amp2		5567.0
fm0		1855.6
fm1		0.03
fm2		0.02
decay0		0.02
decay1		0.02
decay2		-3.92
mpFreqVary		0.1
FollowLag0		0.1
FollowLag1		0.1
FollowLag2		0.1
ctrlLag		0.43
in		0.46
lpCoeff		0.5
compThresh		0.3
compRatio		
interact		
interAmp		

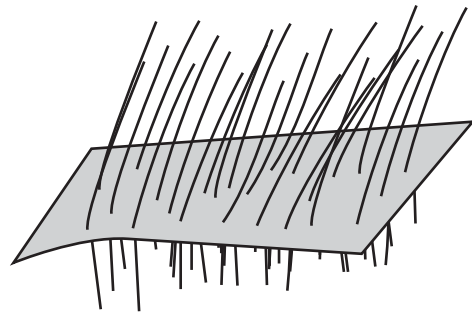
preAmp		3.72
postAmp		19.81
dryAmp		2.2
filterWet		0.21

modulation index									
3.5	2.1	4	11.5	32.5	0	0	0	0	6.9
35	0	4.5	5	2.5	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0
0	0	0	34.5	2	0	24	16	0	0
0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	14.5	15	0	0	0
0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0.65	0	0.4
0	0	0	0	0	0	0	0	0.7	1.25
freqs									

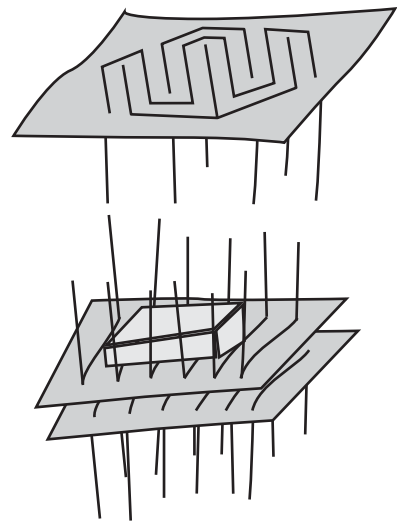
prototyping – sensors



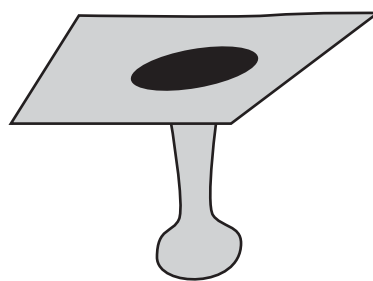
bending



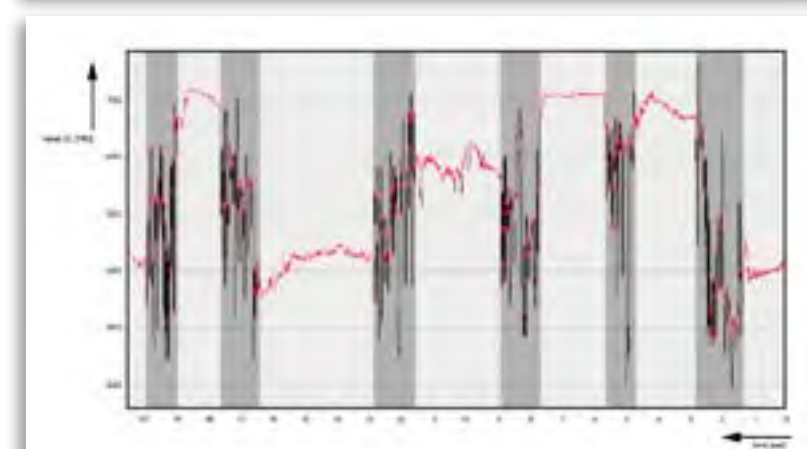
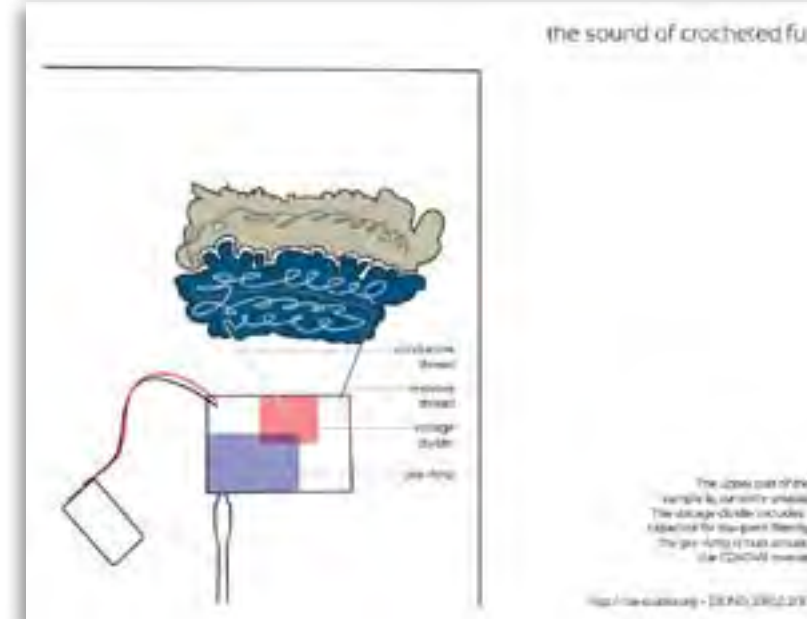
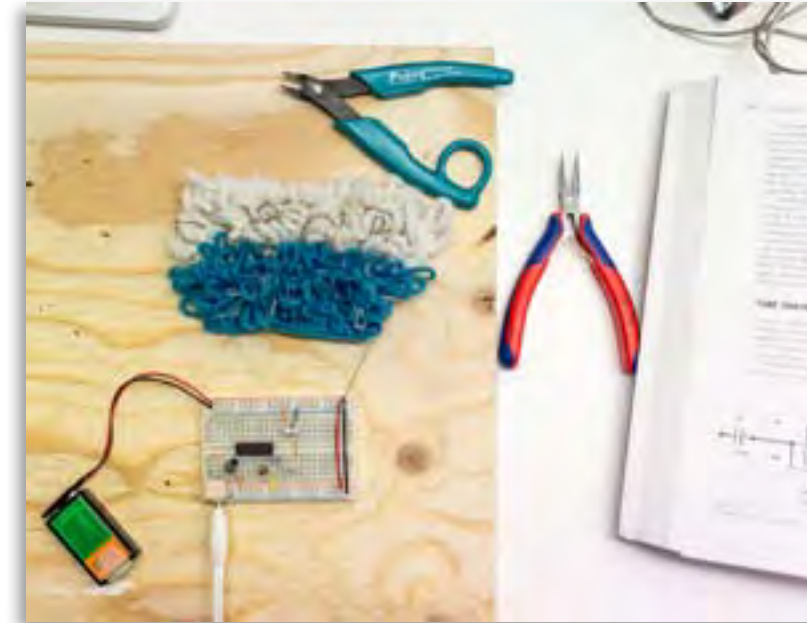
sporadic contact hairs



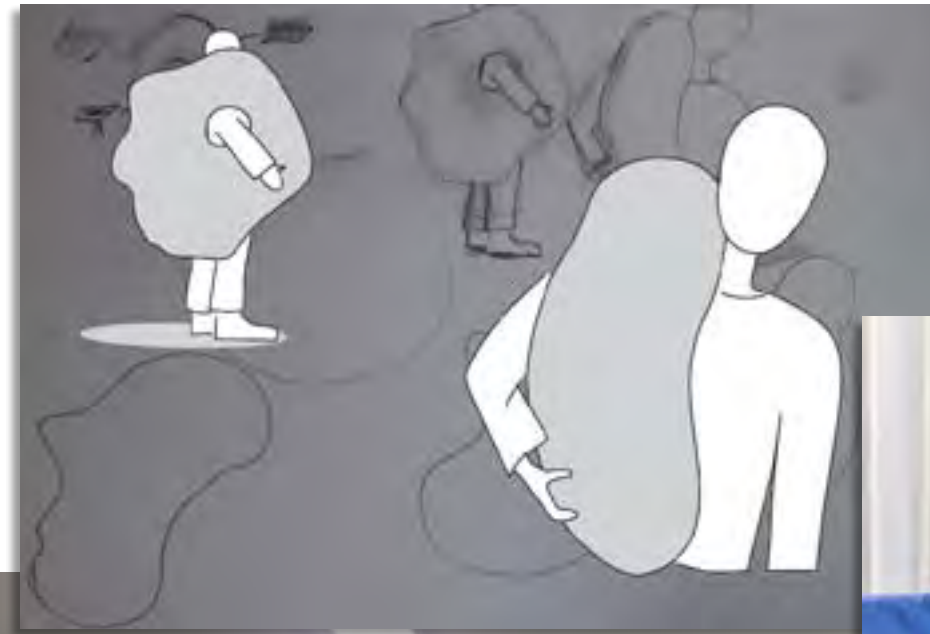
resistive area



capacitive / pressure hole

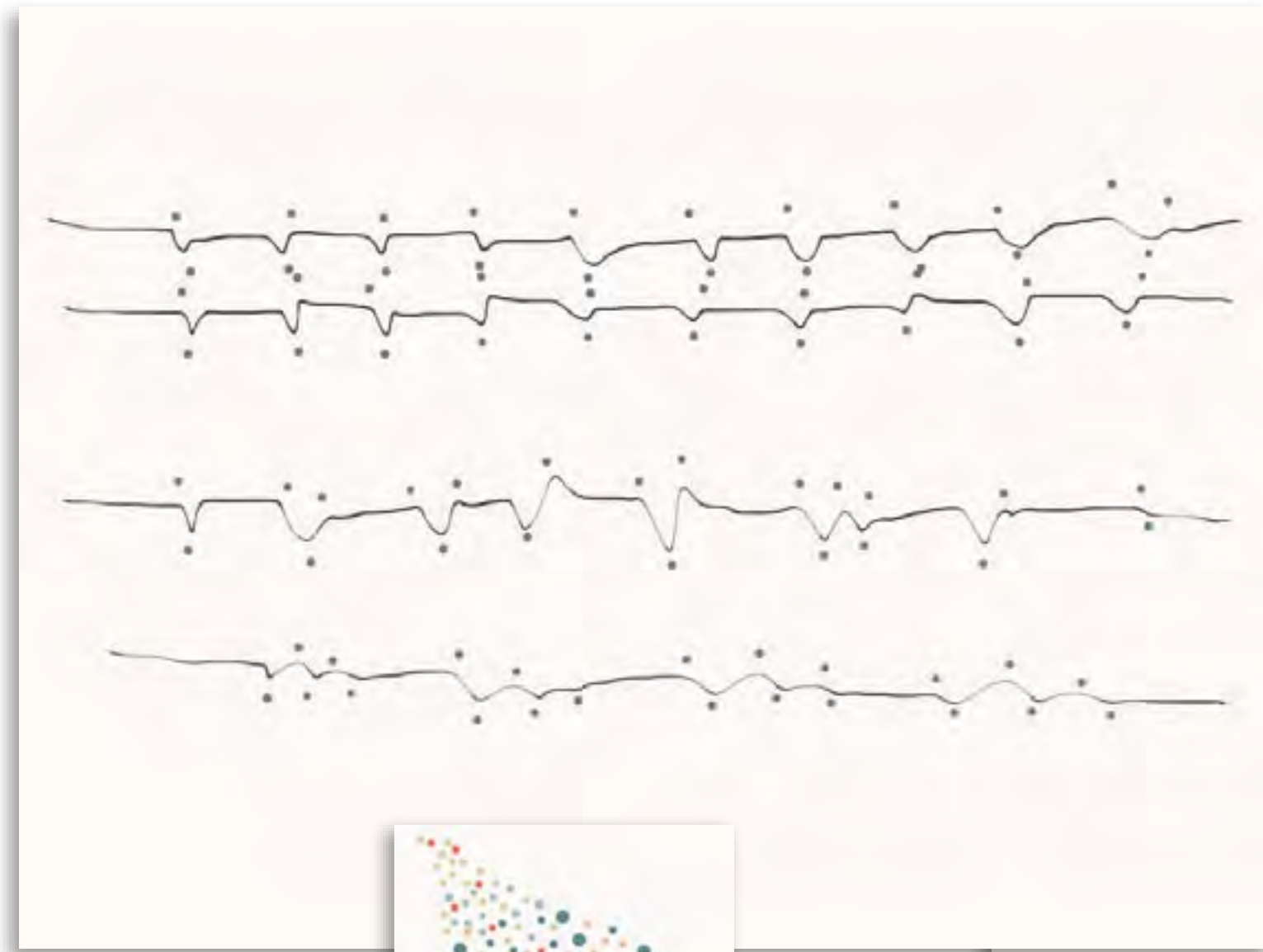


prototyping – instrument designs (I)



iteration II

prototyping – score objects



prototyping – example score

high-pitched rythmical elements
aligned in phase to
rhythms captured from
sensor elements distributed
in the room

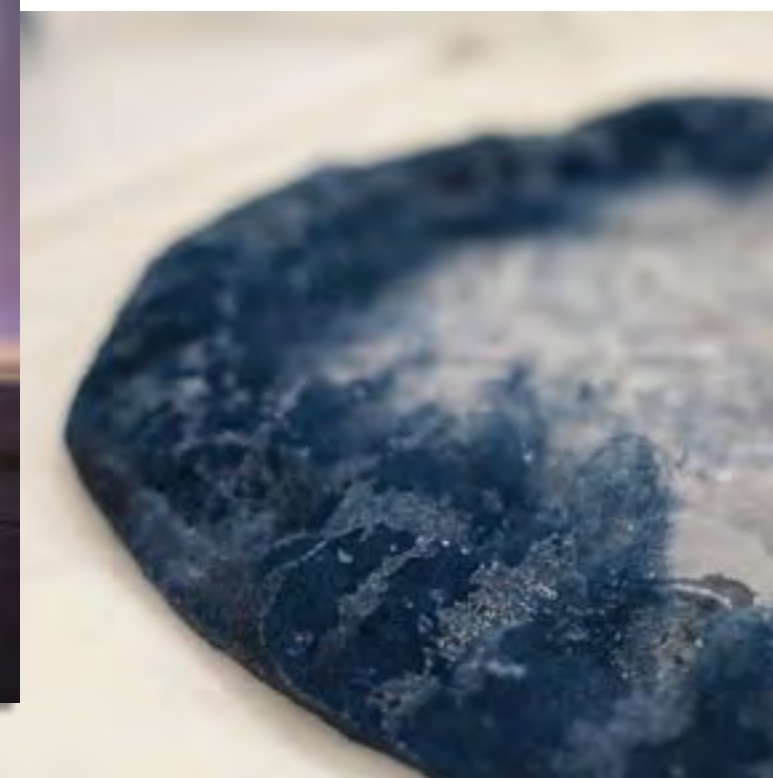
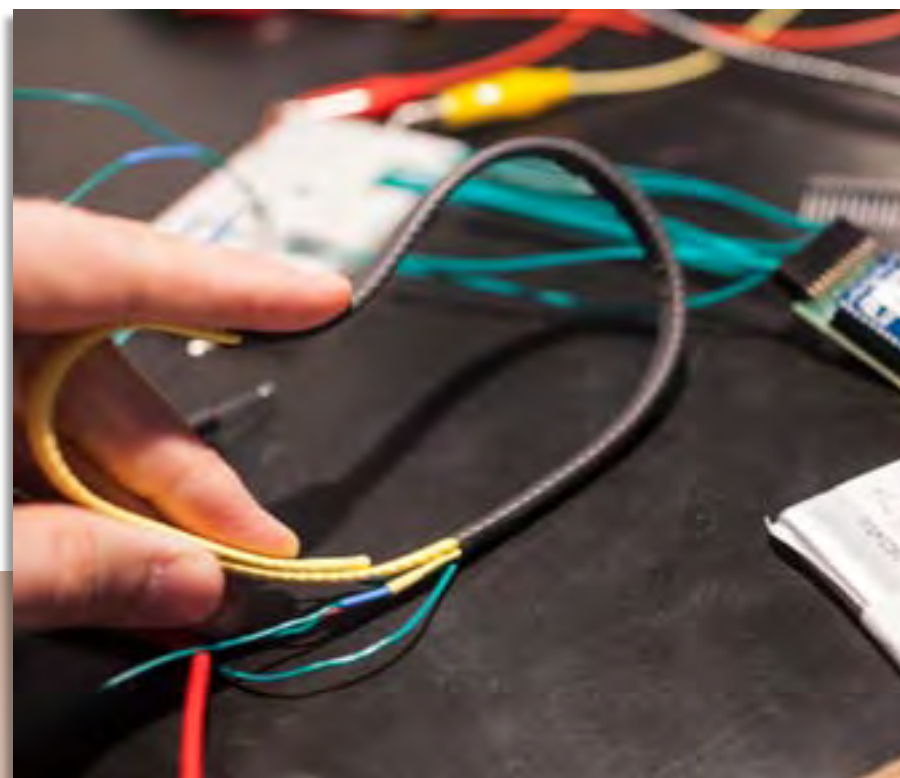
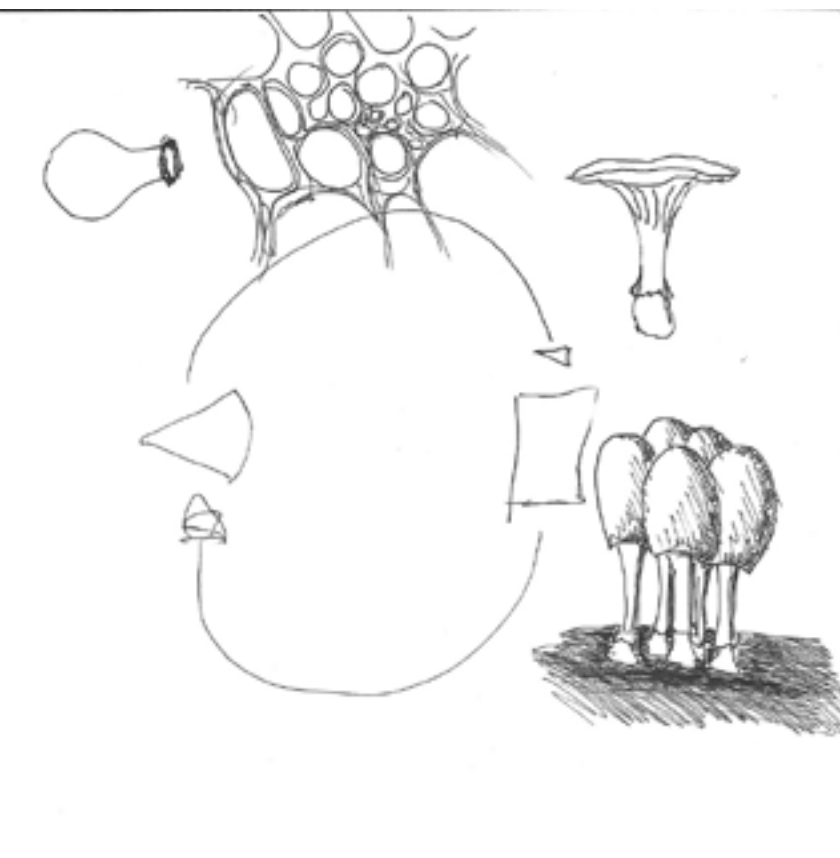
granular structures
triggered and modulated
by manipulation of
textile interfaces

contour/filter settings of
feedback patch determined
by averaged interface
manipulations

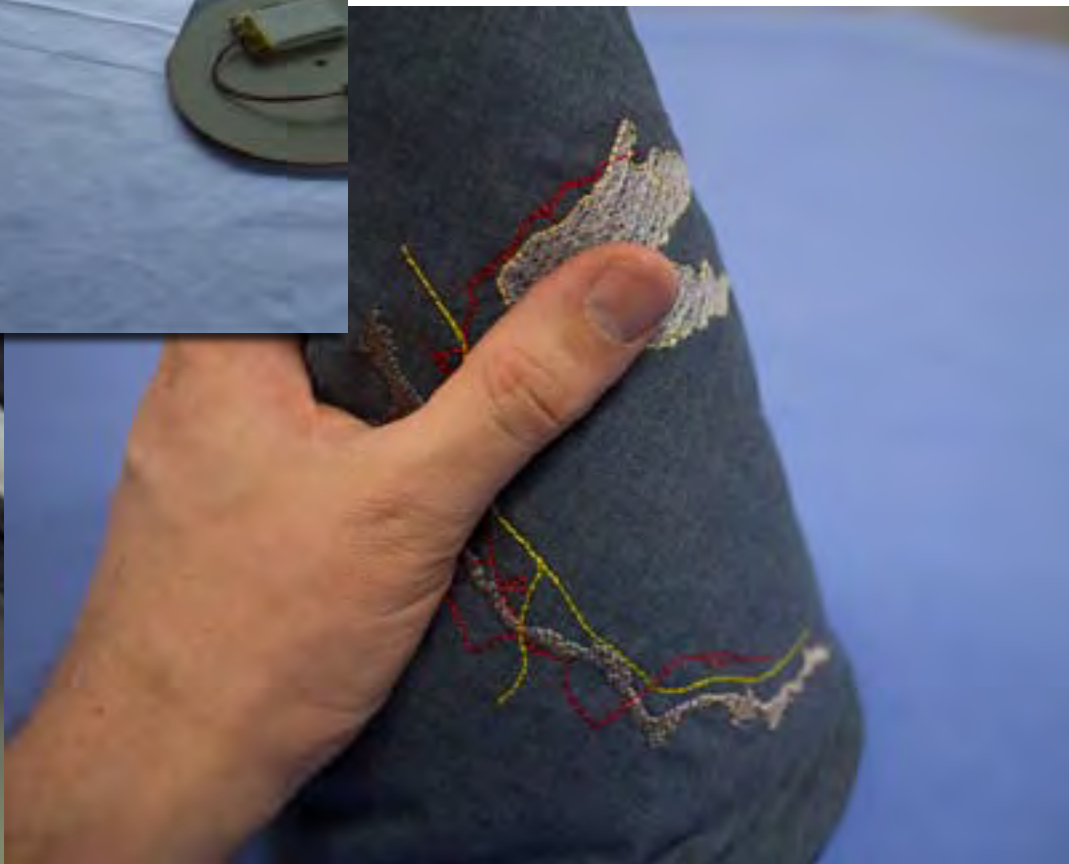
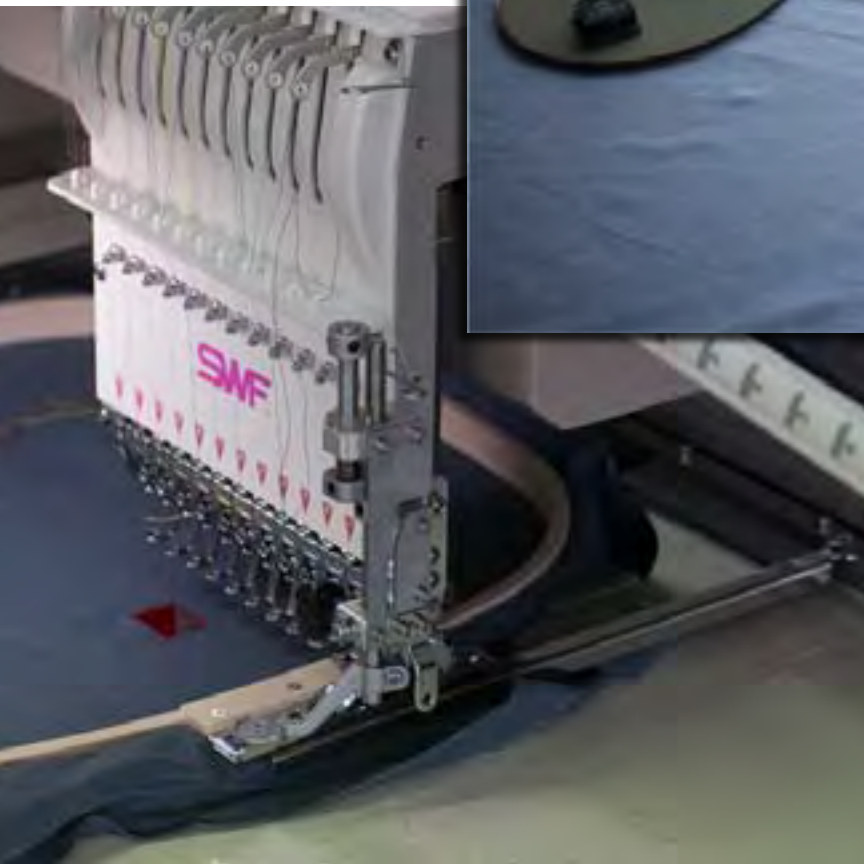
audio feedback
sourced from
ventilation &
room microphones



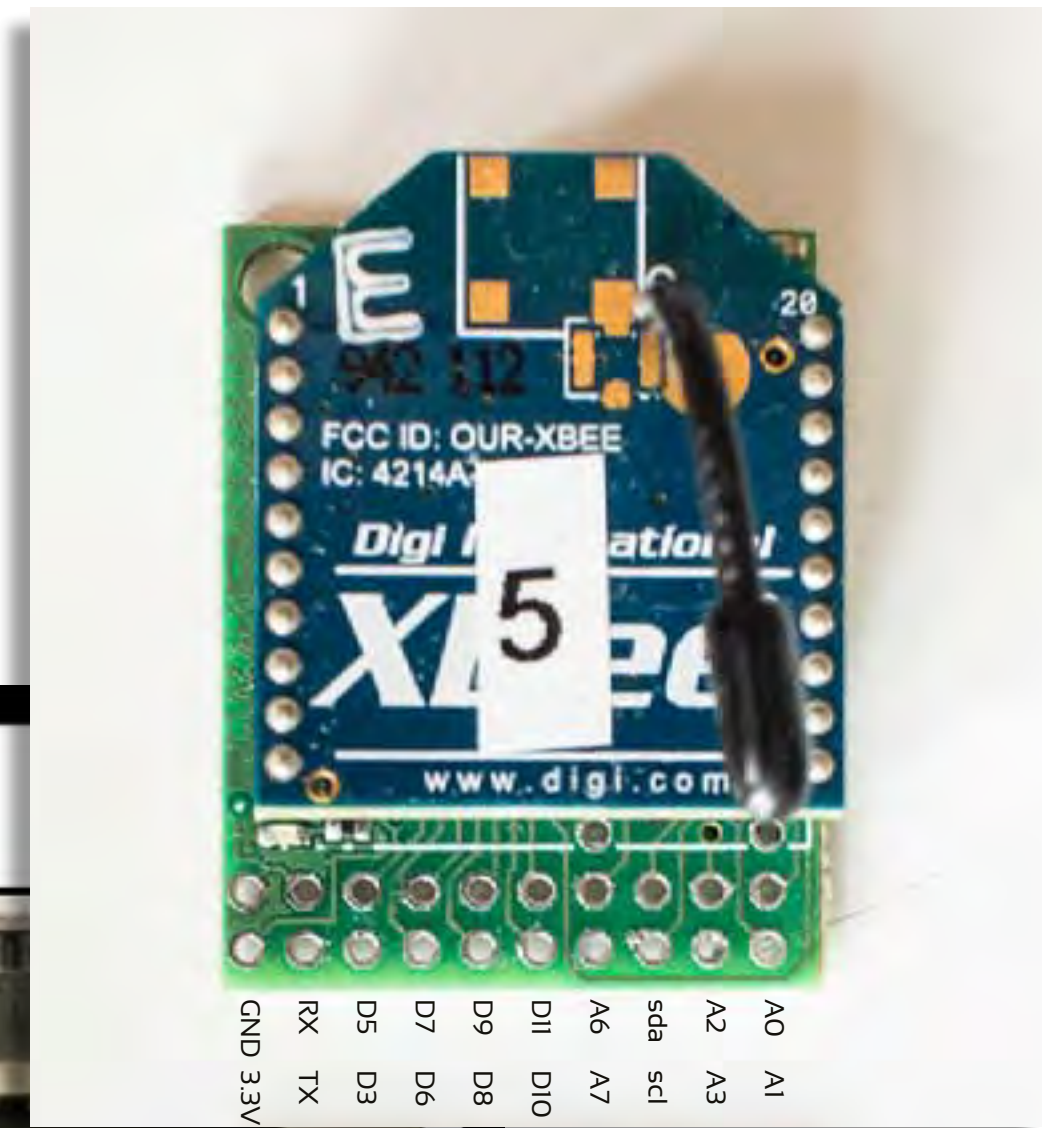
prototyping – instrument designs (II)



prototyping – e-embroidery



prototyping – electronics



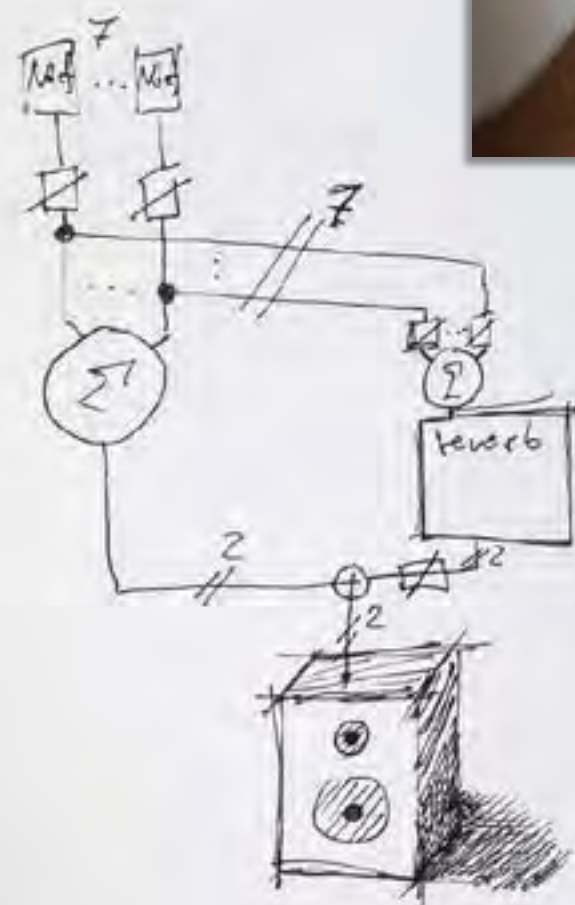
firmware updated for Arduino 1.0

Posted on September 24, 2012 by admin

menu

- [Webshop](#)
- [About Sense/Stage](#)
- [Why the SenseStage MiniBee?](#)

prototyping – instrument designs (II)

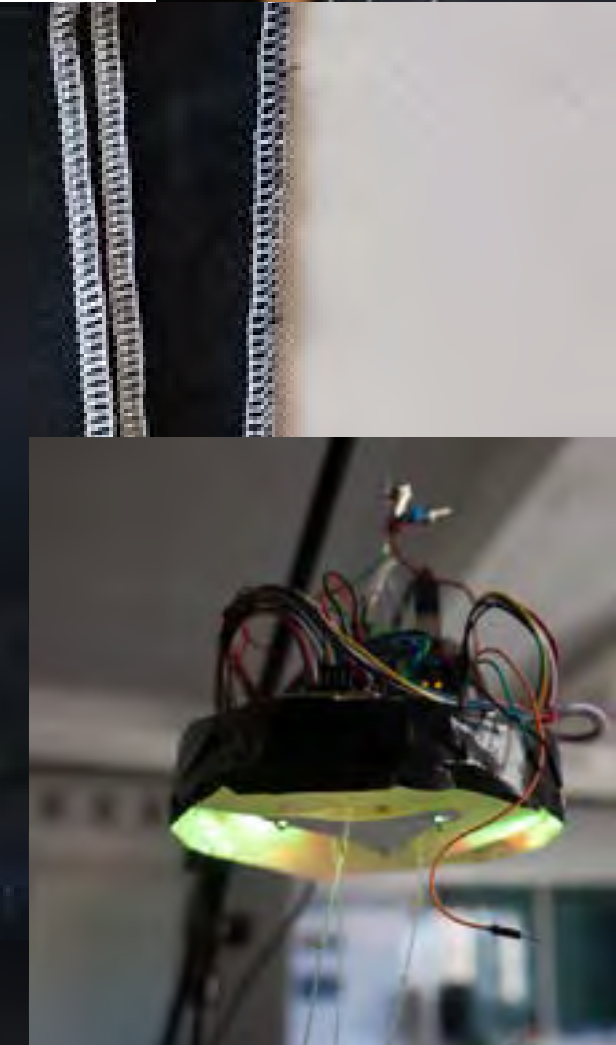
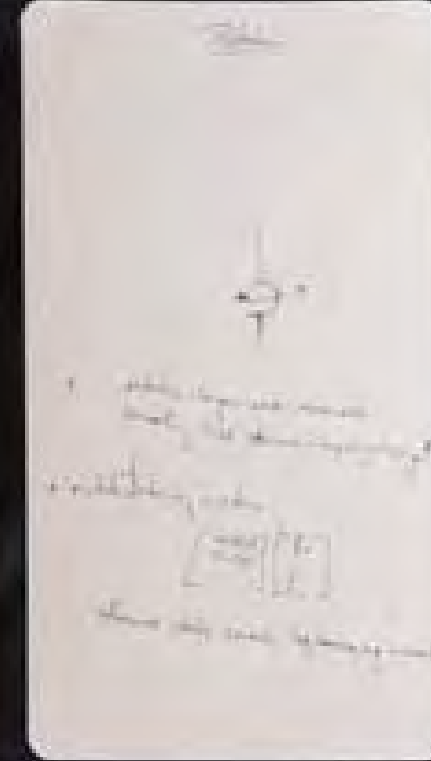
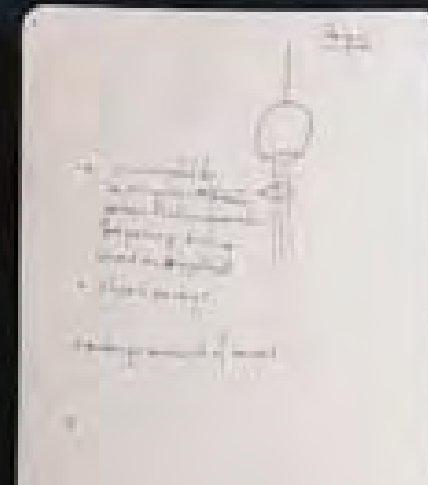
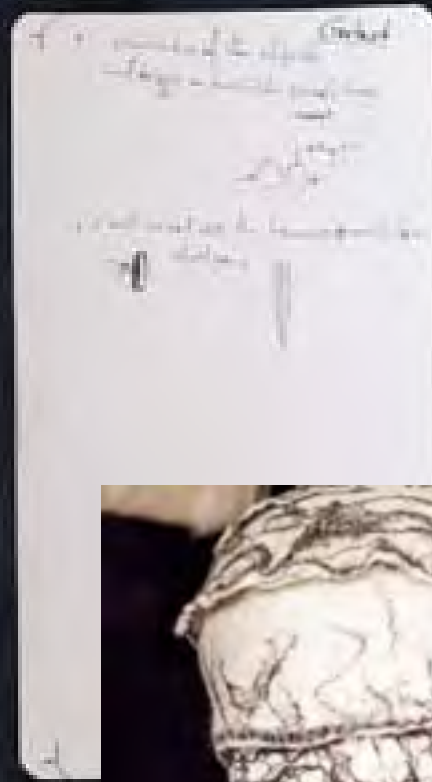
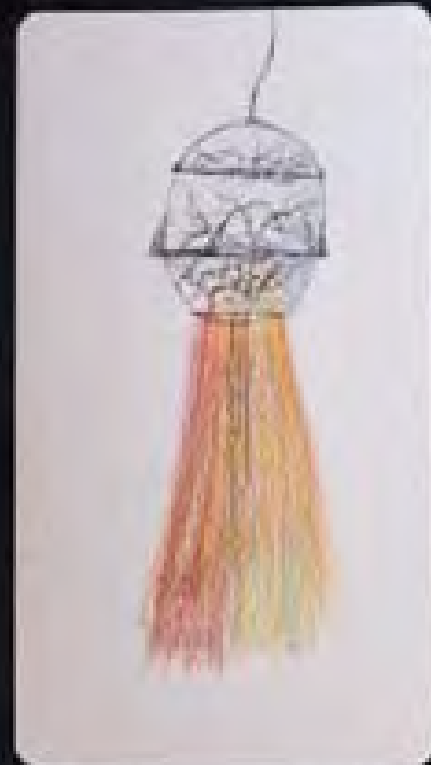


lessons learned so far

- + **remove cables**
everything connected to a new artefact has a meaning when presented in a musical context
- + **we're dealing with individuals**
every person has her very own way of being. this especially is the case in the context of ASD
- + **the ability to interpret reactions has to be gained over time**
trust in long-term experience of the carers is crucial
- + **it is *not* possible to understand the life-worlds of other people**
do not even try to. instead, focus on an inclusionist approach that invites people to join a performance at various levels
- + **everything takes more time than expected**
getting dressed for a winter walk: 15 minutes. sessions have to take at least one hour to be effective
- + **it is possible to give guidance**
explanation of instrument behaviour is possible to a certain extent
- + **every action should result in a reaction**
otherwise, things get uninteresting or confusing

iteration III

prototyping – instrument designs (III)



cooperation partners – research

- + TAI-studio, mediaLab, Department of Media, Aalto University
Till Bovermann
- + Signal processing group, Department of Electrical Engineering, Aalto University
Julian Parker, Vesa Välimäki
- + Embodied interaction Lab, Department of Design, Aalto University
Ramyah Gowrishankar, Jussi Mikkonen
- + TAUKO sustainable clothes, Helsinki
Mila Moisio
- + Textile Art and Design Degree Program (BA, MA) and Textile and Fashion workshops
Pirjo Kääriäinen

- + Institute for time-based media
UdK Berlin/Germany
- + Modality Group
international cooperation of independent artists and researchers to develop musical interfaces

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Aalto University
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design methods

