**Wheelchair sonification – pilot study**

Parametric mapping

Model based

Mixed methods approach

Practical requirements:

* Space with few obstacles

**Design**

One design could be to make four different sonifications, and let them change in randomized order during each trial over 5 minutes (less time => less experience and trying out, but more waiting).

This depends on the setting. Could also be a longer session if at the Barneavdelingen. (e.g. 4 x 5 minutes, 5-6 participants).

Project description (max 1000 characters)

**Interaktiv musikalsk rullestol - design og mulige bruksområder**

Prosjektet sikter mot å undersøke på hvilke måter rullestolen kan brukes som interaktivt lydgenererende instrument og hvilke ulike anvendelsesområder dette kan ha; underholdningsmessig, pedagogisk og kunstnerisk. I prosjektet anvendes bevegelsessensorer som festes til rullestolen for å registrere stolens bevegelser, og disse dataene overføres trådløst til et programvarebasert lydsystem der de styrer lydgenererende instrumenter. Prosjektet vil se på ulike tekniske løsninger, der ulike sensortyper og kommunikasjonsprotokoller testes. En viktig del av prosjektet vil være rette mot å finne gode måter å koble bevegelsesdata og lyd på, og å teste ulike koblinger på ulike brukergrupper i ulike sammenhenger. Deler av prosjektet vil rette seg mot barn og unge som er rullestolbrukere, mens andre deler vil rette seg mer mot voksne. Forskerne har hovedsakelig bakgrunn fra NTNU musikkteknologi, men sikter også mot samarbeid med rullestolbrukere som medforskere og fagfolk fra helsevesenet.

VIDEO RECORDING OF SESSION

Could expect some transference of experience between participants if not using headphones

The sonifications could put an emphasis on one of four properties, e.g.:

1. Direction of chair (absolute)
2. Turning speed (could have different sounds for each direction)
3. (smoothed) Acceleration along the length (driving) axis of the wheel chair. Could have different sounds for negative and positive acceleration.
4. Speed (more active/interesting with higher speed) – perhaps a beat?

How to design the sonifications?

* Each version uses only one parameter?
* Multiple parameters?
* Simple or complex sounds?

Wheelie? (tilt?)

We could then observe to what degree this would affect the driving patterns.

We could collect the data anonymously, but perhaps make the participants fill in age and gender and perhaps prior experience with wheelchair.

Using kids we will have to have consent of parents + report to NSD

**Analysis**

Can be a combination of qualitative (video analysis/interview) and quantitative

* Amount of turning (absolute accumulated rotation)
* Average speed
* Average absolute acceleration along the driving axis
* Periods of stillness

The concept of (flexible) affordance could be central. How the wheel chair affords different sounds, and how that will affect behavior.

Hypothesis:

* Subjects will try to achieve the most interesting sounds (but, different people might find different sounds interesting)
* Subjects will move to try to achieve these sounds

Perhaps we could also ask one of the MCT students to be research assistant on this, e.g. Eirik and Shreejay, who has shown interest in motion tracking etc.?

References

[1-5]

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[2] Burloiu, G., 2018. Adapting the SoundThimble Movement Sonification System for Young Motion-impaired Users. In *2018 IEEE 14th International Conference on Intelligent Computer Communication and Processing (ICCP)*, Cluj-Napoca, Romania 153-157. DOI= <http://dx.doi.org/10.1109/ICCP.2018.8516435>.

[3] Hussein, H., 2012. The influence of sensory gardens on the behaviour of children with special educational needs. *Procedia-Social and Behavioral Sciences 38*, 343-354.

[4] Milios, E., Kapralos, B., Kopinska, A., and Stergiopoulos, S., 2003. Sonification of range information for 3-D space perception. *IEEE Transactions on Neural Systems and Rehabilitation Engineering 11*, 4, 416-421. DOI= <http://dx.doi.org/10.1109/TNSRE.2003.819645>.

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