

Noise

Cognition & Health Workshop

N O C O G N I T I O N S H E A L T H

Wednesday, April 25th, 2012
RWTH Aachen University

Linking Disciplines

Dear Workshop-
Participants,



we are glad to invite you to the International Symposium on noise and its effects on cognition and health. The spirit of the event is characterized by "beyond the decibel".

At the occasion of the International Noise Awareness Day 2012 this is an excellent opportunity to discuss various aspects of noise in society. Noise effects on cognition, communication and learning as well as the context of environmental factors of public health will be analyzed and discussed .

Prof. Dr. Michael Vorländer

Registration

Binding registration and
further information:

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Location

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Driving Instructions:

[http://www.ind.rwth-aachen.de/de/
institut/anfahrt/](http://www.ind.rwth-aachen.de/de/institut/anfahrt/)

Michael Vorländer

Interfacing complex acoustic environments and human perception



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The conditions of sound fields used in hearing research are usually simplified or reduced to fundamental physical fields, such as the free or the diffuse sound field. The concepts of such ideal conditions are easily introduced in theoretical and experimental investigations on effect of direct-to-reverberant sound fields if one specific sound source in a communication situation with one talker is concerned, for example. Noise sources may affect the communication via several complex sound fields as well. When it comes to real-world, the field conditions are more complex with regard to specific stationary and transient properties in room transfer functions and the corresponding impulse responses and binaural parameters. In this presentation it is discussed how sound fields can be categorized in outdoor rural and urban and indoor environments. Furthermore, sound fields in closed spaces of various sizes and shapes and in situations of transport in vehicles, trains, aircrafts are compared with regard to the binaural signals. It is, thus, to be discussed which information about the spatial sound field is required as a robust interface to binaural, physiological and psychological models and how this information can be used to feed electroacoustic reproduction systems with adequate reproducibility.

Irene van Kamp

Noise and health: a public health perspective (some examples from the Netherlands)

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Barbara Shinn-Cunningham

Individual differences in the ability to communicate in noisy settings

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In noisy settings, the abilities to focus, maintain, and switch auditory attention are each critical for allowing us to communicate. Research in my laboratory explores what the acoustic and physiological factors are that allow listeners to accomplish these feats. In this presentation, I will discuss evidence for large differences in how well even normal-hearing listeners can deal with competing sources in the environment, and look to differences in sensory physiology that may help account for these differences. Potential contributions of aging and noise exposure will also be discussed.

Alexandra Bendixen

Predictive coding supports auditory source segregation

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The auditory system is usually confronted with a mixture of different sounds within which it has to disentangle the various sources before it can distinguish between relevant information and background noise. Since many sound sources emit signals in a predictable manner over time, predictive coding may be highly beneficial for segregating one source's activity from signals emitted by concurrently active sources. I will present behavioral and electrophysiological evidence suggesting that the auditory system indeed uses predictive coding for source segregation. Moreover, I will address the interaction of predictive coding with other cues for solving the auditory source segregation problem.

Vera Lawo / Iring Koch

Psychological approaches to auditory selective attention



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In many communicative situations, several sources of acoustic information are simultaneously available for auditory processing. For example, in a cocktail party, auditory selective attention is needed to attend to a single talker while inhibiting processing of other task-irrelevant conversations and background noise present at the same time. Selective attention is often measured in experimental studies using dichotic-listening procedures. In dichotic listening, participants are required to attend to information presented to one ear while ignoring information presented to the other ear. In collaboration with the Institute of Technical Acoustics, we devised a novel selective listening paradigm that allows us to examine the dynamic control of auditory selective attention using a word categorization task. Our data show that instructed, voluntary shifting of the auditory selection criterion incur substantial performance costs. We discuss theoretical issues and potential applications with respect to noise and health.

Jeanette Horn / Wolfgang Dott

Noise pollution, children's health and social frailty in the city of Aachen



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Noise pollution is the second leading environmental stressor on children's health. Most environmental pollutants are unequally shared in regard to the socio-economic situations that children live in. Children from a lower socio-economic status may have to cope with a higher load of environmental hazards such as noise pollution resulting in an overall decreased health status with potential long term negative health effects. Furthermore, environmental hazards are usually difficult to correlate with socio-economic and demographic data. The Parma policy document calls upon stakeholders to work together to decrease children's exposure to noise in general, specifically noise from traffic noise and their daily environments, such as kindergartens, homes and schools. Furthermore in order to develop and implement suitable noise protection guidelines for the future, the WHO aims at establishing a European status report on environmental health inequalities. Therefore, increased data collection in regard environmental hazards children's health and social inequity is necessary in order to successfully fulfil the Parma policy and to provide each child with access to healthy and safe environments by 2020.

Kerstin Persson Waye

Sound characteristics, perception and response - a child perspective

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A focus for our research unit has over the years been to link relevant sound characteristics to health outcomes. The perceived intrusiveness of the sound characteristics is here an important component. We have previously evaluated low frequency sounds and wind turbine sounds by a combination of experimental and epidemiological methods. Until now we have assessed perception and response from an adult perspective however it is becoming increasingly clear that also children are highly affected by their sound environment. In the first national estimation of environmental factors affecting children in Sweden, noise was pointed out as being the most serious. Noise from other children and loud music was reported by the children as most disturbing. Children in pre-schools are exposed to especially high sound levels and for long exposure times, the sounds mainly emanate from other children's voices and activities. There is today very little knowledge on how young children describe and react to these exposures.

The talk will describe how we have gained more knowledge on how 4-6 year old children describe and relate their experience of sound, their bodily and emotional experience of it and how they coped with their environment. In the initial phase we used a qualitative approach. Based on these findings an interview questionnaire was constructed and used in an intervention study where the physical environment of the pre-school was improved acoustically. Some results and the outcome of the validation of the questionnaire will be discussed.

Sabine Schlittmeier

Noise as measure of noise abatement – and other approaches to acoustic optimization of open-plan offices

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In group and open-plan offices, background speech, telephones left ringing, keyboard typing, printers clattering and so forth contribute to the constant presence of background sound. Although the overall given level is often moderate ($L_{eq} = 45-55$ dB(A)), these background sounds function in terms of noise; they are subjectively perceived as highly annoying and reduce cognitive performance in objective performance tests. Measures of noise abatement and acoustic optimization are supposed to reduce these adverse effects; but do they really do that?

The talk presents empirical data on the disturbing impact of office noise and background speech on cognitive performance, in particular on short-term memory. Several experiments are presented which test the potential of different noise abatement measures to reduce the adverse effects of noise on subjective evaluations and objectively given disturbance impact. Such measures are, for example, to reduce level and/or speech intelligibility, or to play-back additional sound, i.e. to use noise as measure of noise abatement. The psychological cause-effect relationships underlying beneficial effects – or their lacking – are described.

Noise Awareness Day

“Controlling Noise is In Your Hands”



“The impact of noise on hearing, health and the quality of life can no longer be disputed. Volumes of literature exist to show the hazards to hearing from repeated exposure to noise. Numerous studies can be found to document that noise, like other stressors, is related to negative physical and psychological changes in humans. Individuals and communities no longer accept that noise is a natural by-product of an industrial society.”

(Center for Hearing and Communication, New York)