Program

7th International Conference on Methods and Techniques in Behavioral Research
Measuring Behavior 2010

Program of the 7th International Conference on Methods and Techniques in Behavioral Research. (Eindhoven, The Netherlands, August 24 - 27 August 2010).

Edited by:

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August 2010
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Welcome to Measuring Behavior 2010

It is my great pleasure to welcome you to Measuring Behavior 2010, the 7th International Conference on Methods and Techniques in Behavioral Research. This conference edition is hosted at the High Tech Campus in Eindhoven. With over 90 companies and institutes, the HTC brings together a dynamic mix of multinational companies, small and medium-sized businesses and technology start-up companies. Campus residents share knowledge, experience, open laboratories and technical infrastructure, enabling better, faster and more cost efficient innovation. An open environment that fuels opportunities for valuable R&D, for successful business partnerships.

In this year’s conference we bring closer together a diversity of communities ranging from neuroscience and zoology to psychology and consumer behavior. The conference location could not have been more symbolic for meeting with a multidisciplinary community interested in sharing methods and techniques for conducting behavioral research.

This year’s Measuring Behavior conference features a very strong technical program, assembled under the expert leadership of Program Co-Chairs Emilia Barakova and Andrew Spink. Together with the Scientific Program Committee and expert reviewers from the community, they undertook the difficult job of carefully evaluating the large number of submitted papers, considering the merits of each through detailed reviews and selecting a technical program of the highest caliber. With a technical program bringing symposia, paper sessions, demonstrations, tutorials, user meetings, workshops, scientific tours and exhibitions there offer the best setting for productive cross-fertilization between research fields in the area of measuring behavior.

Again, welcome to Measuring Behavior 2010 at the High Tech Campus. I wish you a very productive and informative conference and hope that you will take the opportunity to strengthen your network with the Measuring Behavior community.

Boris de Ruyter

Measuring Behavior 2010 Conference Chair
The *Measuring Behavior* Conferences

*Measuring Behavior* is a unique conference about methods and techniques in behavioral research. While most conferences focus on a specific domain, *Measuring Behavior* creates bridges between disciplines by bringing together people who may otherwise be unlikely to meet each other. At a *Measuring Behavior* meeting, you find yourself among ethologists, behavioral ecologists, neuroscientists, experimental psychologists, human factors researchers, movement scientists, robotics engineers, software designers, human-computer interaction specialists... to mention just a few. While the research questions and applications may be highly diverse, all delegates share an interest in methods, techniques and tools for studying behavior. Experience tells us that the focus on methodological and technical themes can lead to a very productive cross-fertilization between research fields. Crossing the boundaries between disciplines and species (from insects to astronauts) can be extremely inspiring. For many delegates, attending a *Measuring Behavior* meeting is an eye-opening experience, to find out which interesting (and often highly relevant) developments are taking place in domains they usually don’t venture into.

*Measuring Behavior* started in 1996 as a workshop in the framework of a European research project “Automatic Recording and Analysis of Behavior”, aimed at sharing the results of our project with colleagues from abroad. Organized by Noldus Information Technology and hosted by Utrecht University, *Measuring Behavior* ’96 attracted over 150 participants from 25 countries. Encouraged by the international interest, it was decided to make Measuring Behavior a recurring conference. In the years that followed, the conference travelled to six other Dutch university towns: Groningen (1998), Nijmegen (2000), Amsterdam (2002), Wageningen (2005), Maastricht (2008) and now Eindhoven (2010).

Over the years, *Measuring Behavior* has developed a formula with a mix of ingredients that has proven quite successful. The meeting is always held in a university town where research on human or animal behavior is prominent, with local scientists playing a prominent role in the conference organization (see table below). Noldus Information Technology serves as conference organizer and main sponsor. For a small company like ours, the conference is a major investment. The registration fees just cover the direct expenses associated with the meeting; the hours spent on the organization (several person-years) are on our account. We gladly do this, because we believe that the focused attention on behavior research methods and techniques will eventually lead to a higher demand for our tools. To prevent commercial bias, however, the scientific program is put together under auspices of an independent Scientific Program Committee, consisting of international experts from a broad variety of disciplines (see page 166 for their names). We are very grateful for their effort to review papers and the helpful input during email exchanges as well as all the other reviewers of the papers in the scientific program.
Over the years, the conference has grown significantly in size, from 153 delegates in 1996 to more than 400 in 2008. At this size, the event is large enough to cover a wide range of topics, yet still small enough for a social program with all delegates. *Measuring Behavior* has also become a truly global meeting: delegates come from dozens of countries on all continents. 2010 is the most international version so far with participants from more than 35 countries and for the papers submitted individually the host country is no longer the one with the most papers (that honor goes to the USA).

In the scientific program, well balanced between human and animal research, one finds a variety of formats for presentation, interaction and exchange of information. The traditional oral papers (full papers) and poster presentations have always been central to the conference. Increasingly, special symposia—focusing on a current methodological or technical theme— are proposed by experts from various disciplines. These symposia illustrate the widening scope of the conference as well as trends in science. From the start, there have been symposia on topics in behavioral neuroscience (such as animal models for human disease or automatic behavior recognition in rats and mice) and data analysis and statistics (such as sequential analysis and pattern detection). Subsequently, the scope extended towards psychology, human factors, ergonomics and movement science. And at this year’s conference we see the arrival of novel topics such as human-robot interaction, measuring behavior in the operating theatre and behavior of forensic scientists.

Besides oral presentations in symposia or free paper sessions, the conference program always includes ample time for posters and demonstrations of software or equipment by participants. The latter are actively encouraged, because it is a format not supported by most other conferences. Full demonstrations in a seminar room were new at the previous *Measuring Behavior* and we are pleased to see that has really taken off, with 12 separate demonstrations on the Thursday afternoon. For several academic inventors, the presentation of their prototype software or hardware tool at *Measuring Behavior* paved the way towards commercialization. This is how CatWalk and FaceReader found their way to...
the Noldus product portfolio. We hope that scientists will continue to present inventions at Measuring Behavior and discuss commercialization opportunities with the vendors present at the meeting.

Another attractive element of the conference is the scientific tours, guided visits to behavioral research facilities and laboratories in and around the hosting university. Tutorials, short courses – mostly about software tools and instruments – taught by expert instructors, have also become a popular program element. Other program elements are user meetings (organized by manufacturers of research tools), and workshops. At this year’s conference, the latter have become more prominent: seven workshops are being held, about topics ranging from autism research to GPS tracking and behavior recognition in wildlife. Finally, there is the commercial exhibition of scientific instruments and software related to behavioral research.

Measuring Behavior is a scientific conference, so special attention is paid to publication of the work presented at the meeting. We started off with a program book and an abstracts book. In 2005 we added printed conference proceedings with short papers and a conference CD. Because of the overlap between the abstracts and proceedings books, we have gone back to two books: a program book and printed proceedings of extended abstracts (short papers). Then there is the conference website (www.measuringbehavior.org). After each conference, the Measuring Behavior website is converted into an archival site, with abstracts of all presentations, which remain accessible. The websites of past conferences form a valuable resource on methods and techniques for behavioral research. Presenting authors will have noticed that they were asked to submit using a rather complex template. This was to enable us to archive all the reviewed papers to the Digital Library of the ACM (the Association for Computing Machinery), which is an important publication channel for those studying human-computer interaction. Finally, selected presentations will be published as full papers in the Journal of Integrative Neuroscience.

Now you find yourself at the 7th Measuring Behavior conference. The organizers have done their best to prepare an optimal mix of scientific, technical, social and culinary ingredients. We hope that you will find Measuring Behavior 2010 a rewarding experience and wish you a pleasant stay in Eindhoven.

Lucas P.J.J. Noldus

Managing Director, Noldus Information Technology bv

l.noldus@noldus.nl
The purpose of the Measuring Behavior conferences has been to provide a broad and interdisciplinary forum for novel methods to define, measure, and analyze human and animal behavior. The conference looks at individual organisms and their behavior along with the behavior of groups, and societies, and processes which can explain the specific behaviors. Measuring Behavior conferences reflect the trends in the developments of social and behavioral sciences, as well as the changes in society and the environment. In this way the conference has become an indicator for the important issues in science and in real life.

The seventh MB conference features themes such as measuring behavior in different professional domains and specific social environments, such as measuring surgical behavior, the behavior of crime scene investigators, the potential conflicts in isolated groups during long-term missions, autistic behavior, sports performance, consumer behavior, etc. It is a trend that continues to develop that behavior is more and more studied a rich natural context in addition to the purely laboratory environment.

Other group of themes revolve around new methods and techniques for measuring specific aspects of animal and human behavior, such as new behavioral models in rats, mice and zebrafish; ambulatory recording of psycho-physiological signals; innovation in movement behavior analysis and tracking techniques; applications of GPS technology such as wildlife tracking.

The tutorials feature methods which are already established for measuring behavior. These include; analyzing behavior and interactions with Theme, analysis of behavior using operant conditioning methods; Pavlovian conditioned freezing; two tutorials on BIOPAC physiological data acquisition systems, ExpertEyes (an opensource eye-tracking system) and as well as tutorials on commercially avialblae eye trackers, behavioral research and digital video, and MotoRater (a new, system for quantification of locomotor impairment in rodents with CNS damage).

Measuring movements, gaze, facial expressions, for the purpose of understanding and prediction of emotions, and social conflicts are popular themes of the conference, present in the symposia, workshops, and the main program. The symposia that feature those are; The significance of voluntary exploration to monitor emotional behavior of rodents, Unveiling affective signals, Large and small scale physiological recordings in behavioral context, Monitoring of social interactions and initial signs of conflicts in isolated groups during long-term missions. Topical topics include measurement of intelligent technologies such as Measuring (ambient) persuasive technologies. We see that increasingly behavioral scientists do not just rely one one way of collecting their data, but that multiple modalities
are combined to give more insight into the behaviors of the subjects.

Studies of measuring human and animal behavior have resulted in a wide range of results, some of which have inspired interesting and societal relevant applications. The novel applications in their turn pose the need for new measuring approaches and technological solutions. We hope that the discussions during the upcoming conference will help us cast a new critical look at existing methodologies and identify novel applications for existing measuring methods. The creative atmosphere that the conference creates will inspire new methods for measuring behavior that will be based on the discussions on the shortcomings in the existing methods and techniques.

MB2010 will take place in the city of Eindhoven, a Dutch center for high-tech industries and innovative technologies. Established industries such as, engineering, the automotive industry and electronics coincide with new sectors as industrial distribution, environmental technology, medical technology and information technology. The integration of research and development activities are the central engine powering the development of the region. 50% of the total amount spent annually on research and development in The Netherlands is invested in the Eindhoven Region, which rightfully holds the slogan “Leading in Technology”.

Emilia I. Barakova
Andrew Spink

*Chairs, Scientific Program Committee*

*Measuring Behavior 2010*
Acknowledgements

Sponsors

The organizers of *Measuring Behavior 2010* gratefully acknowledge the support from the following organization:

![NL Agency](image)

**NL Agency**
*Ministry of Economic Affairs*

IOP Mens-Machine Interactie

![Philips](image)

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- Collect behavioral data and assess emotions
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- Integrate video, eye tracking, and physiological data
- Discover our state-of-the-art, fully installed observation labs
- Join a worldwide community of users

The Observer™ – the professional and user-friendly software for the collection, analysis, and presentation of observational data. Use the new questionnaire tool uASQ in sensory tests to ask a test participant questions about the test products.

FaceReader™ – assess emotions with the unique software for automatic analysis of facial expressions: sad, happy, disgusted, scared, angry, and surprised.

Lab solutions – from portable to customized stationary observation labs to make synchronous recordings of video, eye movements, physiology, and behavior. Observe in a lab, a store, or an in-house setting and experience the excellence of Noldus’ solutions.

Services – all our solutions come with training and technical support, and you can always contact us for consulting services and rental opportunities.

Innovative solutions for human behavior research

www.noldus.com
Conference Program at a Glance

Location
The following pages give an overview of the conference program. For the location of the different rooms, please take a look at the map of the High Tech Campus Eindhoven on page 160.

Lunch, coffee and tea is served in the Central Hall of the Conference Center. Posters and demonstrations are displayed in the rooms Bohr and Raman. Authors will present their work on Thursday.

Detailed program schedule
A detailed description of each session including time schedule and speakers is given later throughout the program book. Please notice that sessions do not always end at the beginning of a lunch, coffee or tea break, but sometimes continue into the first part of the break.

Welcome and Farewell reception
Join our Welcome reception on Tuesday from 17:30 hours and meet other conference delegates for a drink at the Lounge of the conference center! Registration will also take place during this reception. On the last day of Measuring Behavior 2010 Farewell drinks will take place at the conference centre, at 17:30 hours.
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<th>Registration desk</th>
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<td>Tutorial</td>
<td>Advanced Trial and Hardware Control in EthoVision XT (p. 96)</td>
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<td>The MotoRater: A new, standardized testing system for quantification of locomotor impairment in rodents with CNS damage (p. 95)</td>
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Keynote Speakers
Keynote speakers

We are very pleased that the following renowned scientists will present a keynote lecture during the conference:

On Wednesday:

**Professor Naotaka Fujii**

*Multi-dimensional recording in social primates: method and application*

Naotaka Fujii is laboratory head of Laboratory for Adaptive Intelligence and unit leader of BTCC interactive brain communication unit at RIKEN.

On Thursday:

**Professor Kerstin Dautenhahn**

*Measuring behaviour in Human-Robot Interaction Studies*

Professor Kerstin Dautenhahn is Professor of Artificial Intelligence in the School of Computer Science at University of Hertfordshire, where she is coordinator of the Adaptive Systems Research Group. Her main areas of research are Human-Robot Interaction, Social Robotics, Socially Intelligent Agents and Artificial Life.

On Friday:

**Scott Makeig**

*Measuring what the brain does, what it experiences, and what it controls: Mobile Brain/Body Imaging*

Scott Makeig is Research Scientist & Director of the Swartz Center at the Computational Neuroscience Institute for Neural Computation, University of California in San Diego, USA.
Professor Naotaka Fujii

Multi-dimensional recording in social primates: method and application

Date: Wednesday, August 25
Time: 09:00-10:00
Location: Einstein auditorium

About the speaker
Naotaka Fujii was granted MD in 1991 and PhD in 1997 at Tohoku University School of Medicine. He started his career as Ophthalmologist after graduating medical school and later switched to Neuroscientist. His first post-doctoral position was appointed in Graybiel lab at MIT, USA. At MIT, he conducted a research revealing neural mechanism of sequential oculomotor behavior in monkeys. Then, he moved back to Japan in 2004 and joined Dr. Iriki’s lab at RIKEN (Laboratory for Symbolic Cognitive Development) as deputy lab head and started studies of social brain function and development of interactive brain machine interface. He is a member of Society for Neuroscience, Japan society of neuroscience and Japan society of Physiology.

Naotaka is interested in Social Brain Function and Brain Machine Interface. He is trying to combine these two research topics to understand how we can make adaptive behavior. Especially development of interactive brain machine interface is the most important research theme for him. He is also interested in development of interactive virtual reality (VR) environment in which subject can make interactive communication as same as reality. In future, he is dreaming revealing human brain function by using interactive BMI and VR technologies.

Naotaka wrote several books. One of the books titled “SOCIAL BRAINS” was awarded The 63rd MAINICHI Publication and Culture Award in Natural Science Category.

Keynote Lecture
Social brain function is a neural mechanism of communication that enables us to make social context dependent behaviors. The function has to deal with complex parameters in environment and behavior of surrounding others to select socially correct behavior at the moment. Thus learning the function also requires recording and analyzing multi-dimensional data which conventional physiological methods couldn’t handle.

To break such technical limitations in learning social brain function, we have developed multi-dimensional recording technique (MDR). MDR consists of two state of the art
technologies, multi-electrode recording technique and motion-capture system. We can record neural activity from wide brain regions and precise motion data simultaneously as well as other biological parameters, like eye position, heart rate, blood pressure, skin conductance, muscle activity and etc, while the subject and other agents are freely behaving.

I will introduce detailed information of MDR and explain how we could apply the technique in Japanese macaque during social task.
Professor Kerstin Dautenhahn

Measuring behaviour in Human-Robot Interaction Studies

Date: Thursday, August 26
Time: 09:00-10:00
Location: Einstein auditorium

About the speaker
Kerstin Dautenhahn pioneered research in robot social learning and imitation, and the study of robots in autism therapy. She has published more than 200 research articles and has been involved in several European research projects as Principal Investigator of her research team.

Kerstin has authored and edited several books and frequently organizes international research workshops and conferences. She is Editor in Chief of the journal Interaction Studies, and Associate Editor of the journals Adaptive Behavior, the International Journal of Social Robotics, and IEEE Transactions on Autonomous Mental Development. She is a Fellow of the Royal Society for the encouragement of Arts, Manufactures and Commerce (RSA).

Keynote Lecture
For more than 10 years I have been involved in human-robot interaction (HRI) studies in a variety of application contexts ranging from assistive technology for children with autism to robots as assistive home companions. In addition to questionnaires, interviews, focus groups and other measures, behavioural analysis of human-robot interaction plays an important part in this research. Such analysis illuminates how people behave in the presence of and in interaction with robots, which may or may not be consistent with participants’ subjective evaluation (e.g. the user experience).

The ultimate goal of such evaluations is to improve a robot’s performance and social skills. Methodologically, we also investigated and developed new approaches towards user studies in HRI including the use of theatre. I will provide examples of such research and point out particular challenges for behavioural analysis and behaviour design for social robots in these domains.
KEYNOTE SPEAKER ON FRIDAY

Scott Makeig

Measuring what the brain does, what it experiences, and what it controls: Mobile Brain/Body Imaging

Date: Friday, August 27
Time: 09:00-10:00
Location: Einstein auditorium

About the speaker
Scott Makeig was born in Boston, MA, USA in 1946 and completed an honors Bachelors degree, ‘Self in Experience,’ at the University of California Berkeley in 1972. He received a Ph.D., ‘Music Psychobiology,’ from the University of California San Diego (UCSD) in 1985. After spending a year in Ahmednagar, India as an American India Foundation research fellow, he became a psychobiologist at UCSD, and then a research psychologist at the Naval Health Research Center San Diego. In 1999, he became a staff scientist at the Salk Institute, La Jolla, then moved to UCSD as a research scientist in 2002 to develop the Swartz Center for Computational Neuroscience, which he now directs. Recently, university teams he organized won large US Navy and Army research project grants to develop basic research principles for cognitive monitoring from mobile brain/body imaging (MoBI) data, an imaging modality he recently defined and is now working to develop.

Keynote Lecture
Cortical brain areas and dynamics evolved to organize motor behavior in our three-dimensional environment also support more general human cognitive processes. Yet traditional brain imaging paradigms typically allow and record only minimal participant behavior, then reduce the recorded data to single map features of averaged responses and compare the severely reduced behavioral and brain data measures. To more fully investigate the complex links between distributed brain dynamics and motivated natural behavior, we have proposed and are now pursuing development of wearable mobile brain/body imaging (MoBI) systems to continuously capture the wearer’s high-density electrical brain and muscle signals, three-dimensional body movements, audiovisual scene and point of regard, plus new data-driven analysis methods to model their interrelationships to each other and to cognitive context. The new imaging modality can give new insights into how spatially distributed brain dynamics support natural human cognition and agency.
Symposia
Symposia

Several thematic symposia will highlight the methodological and technical state of the art in important domains. These sessions are of interest to a broad range of conference delegates.

The conference contains the following symposia:

- Improving Sports Performance (page 33)
- Large and Small Scale Physiological Recordings in Behavioural Context (page 34)
- Measuring Surgical Behavior (page 37)
- Monitoring of Social Interactions and Initial Signs of Conflicts in Isolated Groups during Long-Term Missions (page 39)
- The Significance of Voluntary Exploration to Monitor Emotional Behavior of Rodents (page 40)
- Unveiling Affective Signals (page 42)
**SYMPOSIUM**

**Improving Sports Performance**

Date: Wednesday, August 25  
Time: 10:00-11:50  
Location: Planck  
Chairs: Patricia de Cocq (Wageningen University, The Netherlands) and Carolien Munsters (NHB Deurne, The Netherlands)

In top class sports, performances of athletes are very close. Small improvements in technique can make the difference between winners and losers. A combination of behavioral analysis and physiological data can play a key role in improving sports performance and developing innovative training tools. It is a challenge to incorporate modern measuring equipment into the daily training of athletes. The measurements should not disturb the athlete and coach and in the same time should record all data necessary. Measurement equipment should therefore be small, wireless and user friendly. Several sports face this challenge.

**Program**

10:00 Performance monitoring in equine sports.  
Patricia de Cocq (Wageningen University, The Netherlands) and Carolien Munsters (Utrecht University, The Netherlands).

João Prudente (University of Madeira), Júlio Garganta (University of Porto, Portugal) and M.Teresa Anguera (University of Barcelona, Spain).

10:40 Coffee break

11:10 The measurement of the visual search behavior in sport. Can it be a new avenue into talent identification and development?  
Geert Savelsbergh (Institute Move VU University, The Netherlands).

11:30 Better performance in marathon running.  
Cees van Bladel (Sports and Technology, The Netherlands).

11:50 End of session.
SYMPOSIUM

Large and Small Scale Physiological Recordings in Behavioural Context

Date: Friday, August 27
Time: 10:00-15:40
Location: Einstein
Chairs: Gernot Riedel and Bettina Platt (University of Aberdeen, United Kingdom)

Coordinated rhythmic activity of neural populations gives rise to oscillatory local field potentials and large scale electroencephalograms at a broad range of frequencies. Synchronous rhythms are likely to reflect relevant information and frequency shifts may underlie experience- or behaviour-dependent functional interactions between neuronal assemblies. While the most common mode of synchronisation may be established through the local cohesive discharge of neighbouring cells or neurones with direct synaptic contacts, global synchronisation may also take place to establish widespread assemblies of disparate neural populations. To detect and analyse such global and local electrophysiological traits is one of the current challenges in basic and translational neuroscience.

This aim is made even more difficult when attempting to correlate electrophysiological data with stage- or task-related behaviour or even cognitive processes. It requires cohesive and linked recordings of physiological, spatial and behavioural responses synchronised and time-stamped in real time. Once aligned in the spatio-temporal domain, analysis needs to implement novel sorting strategies for correlational analysis applying linear and/or non-linear algorithms.

In this symposium, we seek to review some methodical progress focussing on large scale (global EEG) as compared to small scale (single unit) recordings in clearly defined behavioural paradigms in rodents. Speakers are selected because they utilise different technical products for physiological measurements (using cable, transmitter or microchip) and video-observation software of differing specification. We seek to generate intense discussion highlighting both the advantages but also the limits of each system and intend to foster a more intense interaction between manufacturer and scientist for product enhancement.

Program

10:00 Epidural EEG recording using microchips in behavioural context.
Bettina Platt, Andrea Pano, Amar Jyoti and Gernot Riedel (University of Aberdeen, Scotland).
10:20  Timed behaviors in mice.  
Valter Tucci and Glenda Lassi (Italian Institute of Technology, Italy) and Patrick M. Nolan (Mammalian Genetics Unit, Harwell, United Kingdom).

10:40  *Coffee break*

11:10  Route finding in a complex maze in wild-type and CA1 NR-1 KO mice: hippocampal local field potentials, single units and relationship with behaviour.  
Francesco Battaglia (SILS - Center for Neuroscience, Amsterdam, The Netherlands).

11:30  Use of behavioral outcome to assess cognitive state.  
Robert Hampson (Wake Forest University School of Medicine, USA).

11:50  Simultaneous measurement of brain activity, physiology & behavior in large animals.  
Nadine Reefmann (Agroscope Reckenholz-Tänikon Research Station, Switzerland), Thomas Muehlemann and Martin Wolf (ETH and University Zürich, Switzerland), Beat Wechsler and Lorenz Gygax (Federal Veterinary Office, Switzerland).

12:10  Platform for ambulatory assessment of psycho-physiological signals and online data capture.  
Jürgen Stumpp and Panagiota Anastasopoulou (Karlsruhe Institute of Technology, Germany).

12:30  *Lunch break*

14:00  Experimental design for sternocleidomastoid muscle stress measurement.  
Chee Fai Tan, Wei Chen and Matthias Rauterberg (Technical University of Eindhoven, The Netherlands).

14:20  Peripheral arterial tone as an index of ans trade-off.  
Stas Krupenia (Thales Research and Technology, The Netherlands), Eldad Yechiam and Maya Arad (Israel Institute of Technology, Israel).

14:40  Using EEG recordings to examine the relationships between sustained attention and types of background music in individuals with ADHD.  
Chelsea Liang Ru Chew (Nanyang Technological University, Singapore).

15:00  Psychophysiological data collection in an organizational setting: studying interaction between the manager and subordinate during performance review discussion.  
Mikko Salminen, Pentti Henttonen and Niklas Ravaja (Center for Knowledge and Innovation Research, Finland) and Mikael Saarinen (Sensitiva Inc, Finland).
15:20 Extracellular multi unit recording in fear conditioning in mice using a telemetry approach in an automated home cage (DualCage) environment. René F. Jansen, Anton W. Pieneman and Andries Ter Maat, (VU University Amsterdam, The Netherlands), Oliver Stiedl and Manfred Gahr (Max Planck Institute for Ornithology, Germany).

15:40 End of session
**SYMPOSIUM**

**Measuring Surgical Behavior**

Date: Friday, August 27  
Time: 10:00-11:50  
Location: Zernike  
Chair: Gabrielle J.M. Tuijthof (Delft University of Technology, The Netherlands)

Medical technology is evolving quickly. This is also true in the operating theatre, where the introduction of minimally invasive surgery has brought many benefits for the patient: less morbidity, and quicker recovery. Despite these advances in technology, patient safety cannot be guaranteed for 100%.

This symposium aims to give an overview of different methods as developed by researchers in the surgical field. They will all discuss their own efforts to meet the challenge of measuring surgical behaviour. Finally, we can point out a direction towards a future ultimate registration tool.

**Program**

10:00  Teaching arthroscopy: analysis of verbal communication in the operating room.  
Gabrielle Tuijthof (Delft University of Technology / Academic Medical Centre, The Netherlands),  
Alexander Vos, Inger Sierevelt, Mattias Schafroth and Gino Kerkhoffs (Academic Medical Centre, The Netherlands).

Tobias Blum, Nassir Navab and Hubertus Feußner (Technische Universität München, Germany).

10:40  *Coffee break*

11:10  In-vivo measuring surgical workflow activities in the OR.  
Loubna Bouarfa (Delft University of Technology, The Netherlands),  
Laurents P. S. Stassen (Academic Hospital Maastricht, The Netherlands),  
Pieter. P. Jonker and Jenny Dankelman (Delft University of Technology).
Jakob van Oldenrijk and Elisa Rijk (Academic Medical Center Amsterdam, The Netherlands),
Wouter Runne (Onze Lieve Vrouwe Gasthuis Amsterdam, The Netherlands) and
Cees van Egmond (Isala Klinieken Zwolle, The Netherlands).

11:50  *End of session*
SYMPOSIUM

Monitoring of Social Interactions and Initial Signs of Conflicts in Isolated Groups during Long-Term Missions

Date: Friday, August 27
Time: 14:00-15:00
Location: Zernike
Chairs: Roman Gorbunov and Emilia Barakova (Technical University of Eindhoven, The Netherlands) and Karl Tuyls (Maastricht University, The Netherlands)

Success of long-term missions performed by a small group of people in extreme environment critically depends on psychological states of crew members as well as on interpersonal relations within a crew. To predict and prevent conflicts within a crew it is important to develop different techniques for monitoring psychological state of group members and overall social state of the group. Monitoring of different aspects of nonverbal behaviors as well as behavior of crew members during on-line games are demonstrated to be promising approaches to the problem of measuring human behavior within a group.

Program

14:00  PSPA - Test for the study of individual values and mutual perception in small groups
Vadim Gushin and Alla Vinokhodova (State Research Center – Institute for Biomedical Problems RAS, Russia).

14:20  Electronic partners that diagnose, guide and mediate space crew’s social, cognitive and affective processes.
Jurriaan van Diggelen, Mark Neerincx, and Nanja Smets (TNO, The Netherlands)
Mikael Wolff (ESA-ESTEC, The Netherlands) and Leo Breebaart (S&T, The Netherlands).

14:40  Automatic mental health assistant: monitoring and measuring nonverbal behavior of the crew during long-term missions.
Natalia Voynarovskaya, Roman Gorbunov, Emilia Barakova and Matthias Rauterberg (Technical University of Eindhoven, The Netherlands).

15:00  End of session
In this symposium we will provide examples from research approaches in rodents demonstrating the importance of voluntary choice and decision-making under baseline stress-free conditions for emotional behavior. These novel approaches allow for substantially improved interpretation of performance changes as opposed to currently used standardized behavior tests. Emotion cannot be measure directly but instead has to be inferred indirectly from behavioral and concomitant physiological (e.g. neural, autonomic) adjustments.

Standard anxiety tests and fear learning tasks are characterized by human interference that affect emotional behavior and may bias the experimental outcome. This is particularly relevant for tests that depend on locomotor activity-derived measures as index of fear and anxiety. In response to this dilemma, we will discuss current methodological pitfalls and provide insights into our concepts and used methodological approaches including choice behavior with multiple measures extending to aspects of the organization of behavior (actualgenese: the moment-to-moment dynamics of behavior). Thus, human interference is largely excluded in these experiments while the duration of experiments is extended to several days.

These novel approaches follow the main features of natural exploratory behavior starting out from a safe home base and driven by the motivation to investigate novel areas. The motivation for exploration is generally the drive to find resources or reproductive needs while facing the risk of the unknown e.g. potential predators. Exploration implies novelty detection and thus a discrimination from what is known and what is new. The distinction between exploration and cognition is not sharp. The same can be said for the distinction between for instance anxiety and exploration. Thus, home cage observations that involve the activation of different motivational systems are an appropriate setting for assessing the integration of different motivational systems.
Program

10:00  Fear conditioning in an automated home cage (dualcage) environment.
Oliver Stiedl Anton W. Pieneman and René F. Jansen (VU University, Amsterdam, The Netherlands),
Christian Gutzen and Stephan Schwarzer (Biobverse, Germany).

Berry Spruijt, Raymond C. de Heer and Johanneke E. van der Harst (Delta Phenomics, The Netherlands).

10:40  Coffee break

11:10  An automated maze for studying working memory and decision-making in rodents.
Jeansok Kim (University of Washington, USA).

11:30  Genetic dissection of motor activity levels and avoidance behavior in the home cage; Translational Phenotypes for Mood Disorders.
Martien Kas and Annetrude (J.G.) de Mooij-van Malsen (UMC Utrecht, The Netherlands) and Berend Olivier (Utrecht University, The Netherlands).

11:50  Understanding exploratory behavior step by step.
Ilan Golani, Ehud Fonio and Yoav Benjamini (Tel Aviv University, Israel)

12:10  End of session
SYMPOSIUM

Unveiling Affective Signals

Date: Friday, August 27
Time: 11:10-15:40
Location: Lorentz-Zeeman
Chairs: Egon L. van den Broek (University of Twente / Radboud University Medical Center Nijmegen, The Netherlands), Anton Nijholt (University of Twente, The Netherlands) and Joyce H.D.M. Westerink (Philips Research, The Netherlands)

The ability to process and, subsequently, understand affective signals is the core of emotional intelligence and empathy. However, more than a decade of research in affective computing has shown that it is hard to develop computational models of this process. We pose that the solution for this problem lays in a better understanding of how to process these affective signals. This article introduces a symposium that brought together various approaches towards unveiling affective signals. As such, it is envisioned to be a springboard for affective computing.

Program

10:00 Unveiling affective signals.
Egon L. van den Broek & Anton Nijholt (University of Twente, The Netherlands), Joyce H.D.M. Westerink (Philips Research, The Netherlands).

10:20 Mimicry as a tool for understanding the emotions of others.
Marielle Stel and Kees van den Bos (University of Utrecht, The Netherlands).

10:40 Coffee Break

11:10 Relative affective blindsight for fearful bodily expressions.
Bernard M.C. Stienen and Beatrice de Gelder (MGH/MIT/HMS Athinoula A. Martinos Center for Biomedical Imaging, MA, USA / Tilburg University, The Netherlands).

11:50 Motor, emotional and cognitive empathic abilities in children with autism and conduct disorder.
Danielle M.A. Bons, Floor E. Scheepers, Nanda N.J. Rommelse, and Jan K. Buitelaar (Karakter University Center Nijmegen, The Netherlands / Radboud University Medical Center Nijmegen, The Netherlands).

12:10 Facial EMG as a tool for inferring affective states.
Anton van Boxtel (Tilburg University, The Netherlands).
12:30  

*Lunch break*

14:00  
Automatic measurement of affect in dimensional and continuous spaces: Why, What, and How?  
Hatice Gunes and Maja Pantic (Imperial College London, United Kingdom).

14:20  
Measuring affective and social signals in vocal interaction.  
Khiet P. Truong (University of Twente, The Netherlands).

14:40  
Social signal processing: understanding nonverbal communication in social interactions.  
Alessandro Vinciarelli and Fabio Valente (University of Glasgow, UK / Idiap Research Institute, Switzerland).

15:20  
Forum discussion

15:40  
*End of session*
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Full Papers
Full Paper sessions

Full Paper sessions are oral presentations grouped by topic.

The conference contains the following Full Paper sessions:

- Measuring the Behavior of Laboratory Animals (page 47)
- Statistical Techniques and Pattern Analysis (page 48)
- Measuring Gaze, Eye Tracking and Facial Expression (page 50)
- Psychological Measurements of Behavior (page 52)
- Studying Human Machine Interaction (1) (page 53)
- Studying Human Machine Interaction (2) (page 54)
- Tracking and the Analysis of Motion (page 55)
- Human Behavior in the Urban Environment; Measurements in the Field and Realistic Situations (page 57)
FULL PAPER SESSION

Measuring the Behavior of Laboratory Animals

Date: Wednesday, August 25
Time: 10:00-14:20
Location: Einstein

Program

10:00 Microstructural assessment of rodent behavior in the hole-board experimental assay.
Maurizio Casarrubea, Filippina Sorbera, Andrea Santangelo and Giuseppe Crescimanno. (University of Palermo, Italy).

10:20 A novel conditioning paradigm enables the dissociation between the formations of context- and cue-dependent memories of drug reward.
Yossef Izhak (University of Miami, USA).

10:40 Coffee break

11:10 Automation of continuous spontaneous alternation to increase the throughput for in vivo screening of cognitive enhancers. Optimization of the Ethovision system for Y-maze test in mice.
Eric Detrait, Catherine Brohez, Etienne Hanon and Marc De Ryck. (UCB Pharma, Belgium).

11:30 Home cage testing of decision-making.
Susanne Koot and Ruud van den Bos (Utrecht University, The Netherlands), Walter Adriani and Gianni Laviola (Istituto Superiore di Sanità, Italy).

11:50 Trainable, vision-based automated home cage behavioral phenotyping.
Hueihan Jhuang, Estibaliz Garrote, Nicholas Edelman, Tomaso Poggio and Thomas Serre (McGovern Institute of Brain Research, USA) and Andrew Steele (California Institute of Technology, USA).

12:10 Refinement through better animal monitoring: how behavioural researchers can contribute.
Penny Hawkins (RSPCA, United Kingdom).

12:30 Lunch break

14:00 Natural color preference in the zebrafish (Danio rerio).
Avdesh Avdesh, Mathew T Martin-Iverson, Alinda Mondal, Mengqi Chen, Giuseppe Verdile and Ralph N Martins (Edith Cowan University, Australia).

14:20 End of session
FULL PAPER SESSION

Statistical Techniques and Pattern Analysis

Date: Wednesday, August 25
Time: 14:00-17:30
Location: Zernike

Program

14:00 Estimating slope and level change in N=1 designs.
Antonio Solanas, Rumen Manolov (University of Barcelona, Spain) and Patrick Onghena (Katholieke Universiteit Leuven, Belgium).

14:20 DyaDA: An R package for dyadic data analysis.
David Leiva and Antonio Solanas (University of Barcelona, Spain), Han de Vries (University of Utrecht) and David A. Kenny (University of Connecticut, USA).

14:40 The algorithm for detection fuzzy behavioral patterns.
Valera Vishnevskiy and Dmitry P. Vetrov. (Moscow State University, Russia).

15:00 Machine learning techniques for parameter selection and automated behavioral classification.
Dimitris Fekas (Noldus Information Technology, The Netherlands), Raymond de Heer, Marco Mellace and Berry Spruijt (Delta Phenomics, The Netherlands) and Cajo ter Braak (Wageningen University and Research Centre, The Netherlands).

15:20 Using ideas of Kolmogorov complexity for studying animal behavioural patterns.
Sofia Panteleeva, Danzanov Zhargal and Reznikova Zhanna (Institute of Systematics and Ecology of Animals, Russia).

15:40 Tea break

16:10 Ball recovery in the handball tournament of the 2008 Beijing Olympic Games: sequential analysis of positional play as used by the Spanish team’s defence.
António Lopes (Universidade Lusófona, Portugal) Oleguer Camerino (INEFC-University of Lleida, Spain), Mª Teresa Anguera (University of Barcelona, Spain) and Gudberg Jonsson (University of Iceland).

16:30 DataPrism: a tool for visualizing multimodal data.
Adam Fouse and James D. Hollan (University of California, San Diego, USA).
16:50  Video deep tagging and data archiving/processing in the comparative mind database.
George Kampis and Adam Miklosi (Eötvös University, Hungary),
Zsofia Viranyi (Konrad Lorenz Inst. for Evol. and Cog. Research, Austria) and

17:10  Using postural control system measures to detect hypovigilance.
Thomas Schnupp, Adolf Schenka, David Sommer, Martin Golz (University of Applied Sciences Schmalkalden, Germany) and
Jarek Krajewski (University Wuppertal, Germany).

17:30  End of session
FULL PAPER SESSION

Measuring Gaze, Eye Tracking and Facial Expression

Date: Wednesday, August 25
Time: 10:00-15:20
Location: Lorentz-Zeeman

Program

10:00 Measuring instant emotions during a self-assessment test: The use of FaceReader.
Vasileios Terzis, Christos N. Moridis and Anastasios A. Economides (University of Macedonia, Greece).

10:20 Comparison of eye tracking systems with one and three cameras.
Christer Ahlström and Tania Duki (Swedish National Road and Transport Research Institute (VTI), Linköping, Sweden).

10:40 Coffee break

11:10 Gaze metrics for efficient and safe operations of hemodialysis.
Hirotaka Aoki (Tokyo Institute of Technology, Japan) and Satoshi Suzuki (Tokyo Women's Medical University, Japan).

11:30 Automatic recognition of lower facial action units.
Isabel Gonzalez, Hichem Sahli and Werner Verhelst (Joint Research Group on Audio Visual Signal Processing (AVSP), Belgium).

11:50 Facial expression classification based on local spatiotemporal edge and texture descriptors.
Yulia Gizatdinova, Veikko Surakka, Erno Mäkinen and Roope Raisamo (University of Tampere, Finland) and Guoying Zhao (University of Oulu, Finland).

12:10 Comfort and acceptability study of 3D devices.
Jean-Marc Diverrez, Dusan Iorgovan, Céline Nicolas, Gilles Coppin (Telecom Bretagne, France) and Alice Naylor (UBO, France).

12:30 Lunch break

14:00 Eye tracking analysis: application in a case study of an fast moving consumer goods product.
Emma Lógó, Eszter Józsa and Balázs Péter Hámornik (Budapest University of Technology and Economics, Hungary).
14:20  Physiological measures, eye tracking and task analysis to track user reactions in UGC.
Aude Dufresne and François Courtemanche (University of Montreal, Canada), Sandrine Prom Tep and Sylvain Senechal (Hautes Études Commerciales Montréal, Canada).

14:40  Measuring reading characteristics using eye tracking and a context adapting classification system.
Jakob de Lemos (iMotions - Emotion Technology, USA).

15:00  DogCam: a way to measure visual attention in dogs.
Alejandra Rossi, Francisco J. Parada and Colin Allen (Indiana University, USA).

15:20  End of session
FULL PAPER SESSION

Psychological Measurements of Behavior

Date: Wednesday, August 25
Time: 14:00-16:50
Location: Curie

Program

14:00 A dyadic approach for measuring and testing agreement in interpersonal perception.  
Antonio Solanas, David Leiva and Rumen Manolov (University of Barcelona, Spain).

14:20 Acquisition, translativity and transfer of a matching to sample task under different language modes.  
Agustin Daniel Gomez Fuentes and Emilio Ribes Iñesta. (Veracruz, México).

14:40 Early social skills as a function of gender: an observational study of children between 3 – 8 years in Andhra Pradesh, India.  
Mayuri Kandalla and Pavitra Bhat (Angr Agricultural University, India).

15:00 Measuring potential cues for depression in adolescents.  
Martijn Balsters, Emiel Krahmer, Marc Swerts and Ad Vingerhoets (University of Tilburg, The Netherlands).

15:20 Observing the paraverbal communication of coaches in competitive match situations.  
Marta Castañer and Catarina Miguel (University of Lleida, Spain), Mª. T. Anguera (University of Barcelona, Spain) and Gudberg K. Jonsson (University of Iceland).

15:40 Tea break

16:10 Temporal dynamics of multimodal multiparty interactions: A microgenesis of early social interaction.  
Kaya de Barbaro, Christine M. Johnson and Gedeon O. Deák (University of California, San Diego, USA) and Deborah Forster (MOBU Research Inc., USA).

16:30 Measuring behavioral indices of cognitive processing in children.  
Linda Phan, Rosemary Meza, Judy Reilly (San Diego State University, USA) and Gwen Littlewort, Marni Bartlett (University of San Diego California, USA).

16:50 End of session
FULL PAPER SESSION

Studying Human Machine Interaction (1)

Date: Wednesday, August 25
Time: 16:10-17:30
Location: Einstein

Program

16:10 A method for remote and semi-automatic usability evaluation of web-based applications through users behavior analysis. 
Ariel Vargas, Heloísa Vieira da Rocha (University of Campinas, Brazil) and Harold Weffers (Eindhoven University of Technology, The Netherlands).

16:30 Beyond usability: a methodology to evaluate the affective experience of interaction with e-commerce websites.
Troy Abel (Virginia Tech, USA).

16:50 A framework to measure user experience of interactive online products.
Katrin Schulze and Heidi Krömker (TU Ilmenau, Germany).

17:10 iHeartRate: A heart rate controlled in-flight music recommendation system.
Hao Liu, Jun Hu and Matthias Rauterberg (Technical University of Eindhoven, The Netherlands).

17:30 End of session
FULL PAPER SESSION

Studying Human Machine Interaction (2)

Date: Thursday, August 26
Time: 10:00-12:30
Location: Einstein

Program

10:00 Measuring motor actions and psychophysiology for task difficulty estimation in human-robot interaction.
Domen Novak, Matjaz Mihelj, Jaka Zihrl, Andrej Olensek and Marko Munih (University of Ljubljana, Slovenia).

Gudberg K. Jonsson (University of Iceland) and Kristinn R. Thorisson (University of Reykjavik, Iceland).

10:40 Coffee break

11:10 Measurement of feet-ground interaction for real-time person localization, step characterization, and gaming.
Chris Varekamp and Patrick Vandewalle (Philips Research, The Netherlands).

11:30 Web based measuring system for health monitoring at home.
Luca Rizzi, Cinzia Dinardo, Nicola Savino and Gianluca Ciullo (CETMA Consortium, Italy).

11:50 Towards the use of psychological variables in user profiling.
Ricardo Luiz and Marilha Felismino (Edificio YDreams, Portugal),
Marta Castela and Pedro Marques (Alameda da Universidade, Portugal).

12:10 MAESTRO: Orchestrating user behavior driven and context triggered experience sampling.
Alexander Meschtscherjakov, Wolfgang Reitberger and Manfred Tscheligi (University of Salzburg, Austria).

12:30 End of session
FULL PAPER SESSION

Tracking and the Analysis of Motion

Date: Thursday, August 26
Time: 10:00-12:30
Location: Ernst

Program

10:00 Multi-method analysis of the relationship between individual’s space-time behavior, built environment and the evolution of cognitive representations: application of tracking technologies and internet surveys.
Anastasia Moiseeva and Harry Timmermans (Eindhoven University of Technology, The Netherlands).

10:20 Appraising the aesthetics of human movement: An application to contemporary dance using a motion capture system.
Marta Castañer, Carlota Torrents, Gaspar Morey and Toni Jofre (INESCOP, Spain) and M. Teresa Anguera (University of Barcelona, Spain).

10:40 Coffee break

11:10 Using motion sensing to study human computer interaction in hospital settings.
Katherine Sellen and Mark Chignel (University of Toronto, Canada), Sharon Straus (Micheal’s Hospital, Canada), Jeannie Callum (Sunnybrook Health Sciences Center, Canada) and Jacob Pendergrast (University Health Network, Toronto, Canada).

11:30 A high-resolution system for recording the daily and lifetime behavioral and movement patterns of individual tephritid fruit flies.
James Carey, H.G. Müller, J.-L. Wang and A. Morice (University of California Davis, USA), S. Zou (National Institute on Aging, USA), P. Liedo (El Colegio de al Frontera SurTapachula, Mexico), Leopoldo Robles (National Institute for Astrophysics, Optics and Electronics, Mexico), Donald Ingram (Louisiana State University, USA) and N. Papadopoulos (University of Thessaly Greece).
11:50 Identification of vertical and horizontal movement patterns in cod behavior. Gudberg K. Jonsson (University of Iceland), Vilhjalmur Thorsteinsson (The Marine Research Institute, Iceland) and Gunnar Gudni Tomasson (Reykjavik University, Iceland).

12:10 Measuring 3D arm movements for activities of daily living. Thomas Haslwanter and Jürgen Waldhör (Upper Austria University of Applied Sciences, Austria).

12:30 End of session
FULL PAPER SESSION

Human Behavior in the Urban Environment; Measurements in the Field and Realistic Situations

Date: Friday, August 27
Time: 10:00-16:00
Location: Curie

Program

10:00 Review of real-time visual driver distraction detection algorithms.
Christer Ahlström and Katja Kircher (Swedish National Road and Transport Research Institute, VTI, Sweden).

Alexandra Millonig and Gudrun Maierbrugger (Austrian Institute of Technology, Austria).

10:40 Coffee break

11:10 Assessment of aging effects on drivers’ perceptual and behavioral responses using subjective ratings and pressure measures.
Gyouhyung Kyung (UNIST, Korea) and Maury A. Nussbaum (Virginia Tech, USA).

11:30 Applying non-linear dynamics features for speech-based fatigue detection.
Jarek Krajewski (Univ. of Wuppertal, Germany),
Thomas Schnupp, David Sommer, Christian Heinze and Martin Golz (FH Schmalkalden, Germany).

11:50 Detecting fatigue from steering behaviour applying continuous wavelet transform.
Jarek Krajewski and Tom Laufenberg (University Wuppertal, Germany),
David Sommer, Thomas Schnupp, Christian Heinze and Martin Golz (University of Applied Sciences Schmalkalden, Germany).

12:10 Creating a richer data source for 3d pedestrian flow simulations in public transport.
Veronika Egger (is-design, Austria), Helmut Schrom-Feiertag, Gregory Telepak (Austrian Institute of Technology) and Lisa Ehrenstrasser (inklusiv design, Austria).
12:30 Identifying operators monitoring appropriately.
Dietrich Grasshoff, Catrin Hasse, Hinnerk Eißfeldt and Carmen Bruder (German Aerospace Center, Germany).

12:50 Lunch break

14:00 A detailed analysis of eating behaviour.
Ioannis Ioakeimidis, Per Södersten and Modjtaba Zandian (Karolinska Institute, Sweden).

14:20 Field measurement protocol for team communication: a study of medical rehabilitation team interaction.
Bálázs Péter Hámornik and Márta Juhász (Budapest University of Technology and Economics, Hungary) and Ildikó Vén (National Institute for Medical Rehabilitation, Hungary).

14:40 Measuring professional teams’ information sharing behaviour.
Juliánna Katalin Soós, Mártá Juhász and Balázs Péter Hámornik (Budapest University of Technology and Economics, Hungary).

15:00 Child-activity recognition from multi-sensor data.
Sabri Boughorbel, Jeroen Breebaart, Fons Bruekers, Ingrid Flinsenberg and Warner ten Kate (Philips Research Laboratories Eindhoven, The Netherlands).

15:20 Studying media usage in the living room by measuring Infrared Signals.
Thomas Mirlacher (IRIT – ICS, France), Thomas Fischer and Regina Bernhaupt (ruwido research, Austria).

15:40 Optimization of user satisfaction on an augmented reality based guided tour.
Marília Felismino and Ricardo Luiz (Edifício YDreams, Portugal), Marta Castela and Pedro Marques (Alameda da Universidade, Portugal).

16:00 End of session
Posters
Posters

Posters are divided into two groups:

**Poster group A**
Poster numbers: 1-32
Date: Thursday, August 26
Time: 14:00-15:40
Location: Bohr

**Poster group B**
Poster numbers: 33-63
Date: Thursday, August 26
Time: 16:10-17:30
Location: Raman

There will be an award for the best poster. Please see page 165 for your voting form.
POSTER GROUP A

Poster numbers 1-32
Date: Thursday, August 26
Time: 14:00-15:30
Location: Bohr

4 A new method of computer-supported measurements of distances moved by animals. Julia Brendle, Annas Elisa and Hoy Steffen (Justus Liebig University, Germany).

5 Optimization of a contextual conditioning protocol for rats using combined measurements of startle and freezing. Laura Luyten, Debora Vansteenwegen, Kris van Kuyck, and Bart Nuttin (Katholieke Universiteit Leuven, Belgium).

6 EEG data logging with the NeuroLogger® System: spontaneously occurring electrophysiological correlates of migraine in mutant mice. Alessandra Di Lio, Dimitrula Arabadzisz, Hans-Peter Lipp and Hanns Ulrich Zeilhofer (University of Zurich, Switzerland).

7 Ethosearch: A comprehensive repository of ethograms for use in animal behavior research. Stephen Ross, Megan Ross and Steven Thompson (Lincoln Park Zoo, USA) & Anne Clark (State University of New York at Binghamton, USA).


9 Development and evaluation of an operant-based reversal learning task in the rat, relevance of the visual cue. Sofie Embrechts and Darrel J. Pemberton (Janssen Pharmaceutica, Belgium).

10 Measurement of akinesia in rats: design and validation of a side effect paradigm in freely moving animals. Michel Mahieu, Roland Willems, Hansfried Van Craenendonck and Luc Ver Donck (Johnson&Johnson Pharmaceutical Research and Development, Division of Janssen Pharmaceutica NV., Belgium).
11 Visualizing group dynamics signals.
Erik Kuijpers (GGZE Eindhoven, The Netherlands),
Henri Hambartsumyan and Stef van den Elzen (Eindhoven University of Technology, The Netherlands).

12 Automated video registration in home cage for measuring maternal behavior of wild, aggressive and tame rats.
Maria Solov’eva and Irene Plyusnina (Institute of cytology and genetics of the SB RAS, Russian Federation, Russia),
Igor Tarancev and Evgeny Bulushev (Institute of automation and electrometry of the SB RAS, Russian Federation, Russia).

13 Measuring behavior in complex maritime operations.
Heidi Seljestad, Tone Sydnes, John Ferkingstad, Gisle Kleppe and Vidar Frette (Stord/Haugesund College, Norway).

14 Diagnostics of motivational conflicts through thinking activity.
Anastasia Karpukhina and Olga Arestova (Moscow State University, Russia).

15 Use of ethological rodent behavior to assess efficacy of potential drugs for Alzheimer’s disease.
Robin Roof, Yoko Yabe, Bradley Snyder and Margaret Zaleska (Pfizer Global Research and Development, USA).

16 Who said pedestrian means dull: Observations on street crossing behaviour.
Stephanie Allen, Richard Brown and Timothy O’Leary (Dalhousie University, Canada).

17 Development of behavioral measures of osteoarthritis-induced pain in rabbits.
Anna Vardanyan, Bryan Mastis, Nance Moran, Joseph Serriello and Gloria Matthews (Genzyme Corporation, USA).

18 Progress with MINDS, a testmanager for psychological assessment, research and education. Applications in the forensic psychiatric domain.
Nico Brand (Utrecht University / bureau MindsWare, The Netherlands), Katinka von Borries and Erik Bulten (Pompe Stichting, The Netherlands).

19 Effects of CGP7930 on spontaneous behavior, anxiety and learning in immature rats.
Katerina Ticha, Anna Mikulecka and Pavel Mares (Academy of Sciences of the Czech Republic).
20  Stereoscopic motion analysis of giant honeybees.
    Michael Maurer (Graz University of Technology, Austria),
    Frank Weihmann, Matthias Rüther and Thomas Hötzl (Graz University of
    Technology, Austria) and
    Madhusudan Man Singh (Tribhuvan University, Nepal).

22  Use of automated tracking system across anxiety and depression models in
    rodents .
    Patrick De Haes, Michel Meynen, Kim Hoeks, Theo F. Meert and J. Adriaan
    Bouwknecht (Johnson and Johnson Pharmaceutical Research & Development,
    Belgium).

23  Induction and measurement of basic emotions in subjects and the influence of
    multisensory stimuli.
    Rineke Valstar and Marco Hoeksma (Unilever R&D, The Netherlands).

24  Microstructural assessment of rodent behavior in the hole-board experimental
    assay.
    Maurizio Casarrubea, Filippina Sorbera, Andrea Santangelo and Giuseppe
    Crescimanno (University of Palermo, Italy).
    *The abstract of this poster is in the Full paper section of the Proceedings*

25  Using multivariate analysis for comparing locomotor patterns of Sprague-Dawley
    rats from different european breeders.
    Theresa Andreasson, Jenny Börjesson, Elisabeth Ljung, Katarina Rydén
    Markinhuhta and Marianne Thorngren (Neurosearch Sweden AB).

26  Development and evaluation of a rat water maze system: Impact of maze size and
    other variables on performance.
    Liesbeth Mertens and Darrel J Pemberton (Janssen Pharmaceutica, Belgium).

29  Measurement of locomotor activity in rodents: design of a compact,
    multifunctional, user-friendly and high throughput system.
    Hansfried V.M.M. Van Craenendonck, Anton A.H.P. Megens and Darrel J. Pemberton
    (Janssen Pharmaceutica, Belgium).

30  The links between behavioral markers of performance, personality and
    communication.
    Márta Juhász, Juliánna Katalin Soós and Balázs Péter Hámornik (Budapest
    University of Technology and Economics, Hungary).

31  Food attractiveness and gazing behaviour.
    Klaus Duerrschmid, Max Joechl and Martin Haindl (University of Natural
    Resources and Applied Life Sciences, Austria).
Delay intolerance task: different impact of timeout duration on impulsive and non-impulsive rats.
Francesca Zoratto, Giovanni Laviola, and Walter Adriani (Istituto Superiore di Sanità, Italy).
Measuring Behavior 2010 - Eindhoven, The Netherlands

Poster Group B

Poster numbers 33-63

Date: Thursday, August 26

Time: 16:00-17:00

Location: Raman

33 Quality monitoring and analysis of open field behavior in rats by means of multivariate analysis
Johan Kullingsjo, Theresa Andreasson, Ylva Sunesson and Henrik Ponten (Neurosearch Sweden AB).

34 Different Interpretation of the Hot Plate test in Rats.

35 Preliminary study of behaviour and acoustic emissions in European spiny lobster Palinurus elephas during the interaction with predators.
Giuseppa Buscaino, Francesco Filiciotto, Gaspare Buffa, Antonio Bellante and Vincenzo Di Stefano (National Research Council, Italy).

36 Combining an operant chamber paradigm with [18F]fluorodeoxyglucose microPET imaging.
Christine Marx and Heiko Backes (Max-Planck-Institute for Neurological Research, Germany), Wolfgang Hauber (Department of Animal Physiology, University of Stuttgart, Germany), Björn Lex and Carsten Calaminius (University Hospital Tübingen, Germany).

37 The FischFITMonitor – a new system for monitoring multiple physiological and behavioural parameters in fish.
Georg Staaks, Daniela Baganz and Oliver Jauernig (Leibniz-Institute of Freshwater Ecology and Inland Fisheries, Germany), Carsten Brockmann (Fraunhofer Institute for Reliability and Microintegration, Germany), and Ullrich Balzer (Humboldt-Universität Berlin, Germany).

38 Spatial ECG of the rat during spatial navigation.
Thomas Gener, Diego Lopez and Lorena Perez-Mendez (IDIBAPS, Spain), Christoph Guger and Engelbert Grünbacher (g.tec, Austria).

40 Foraging behavior of yellowjacket workers and worker-larva trophallaxis towards feeding baits laced with fipronil.
Tomislav Curkovic, Carolina Ballesteros and Jaime Araya (University of Chile).

41 Automatic facial emotion recognition in online psychotherapy.
Lorena Alejandra Flores-Plata and Georgina Cárdenas-López (National Autonomous University of Mexico, Mexico).
Use of environmental light cycles to distinguish circadian regulation from direct light modulation of cognitive functions in mice.
Cara Altimus, Tara LeGates and Samer Hattar (John Hopkins University, USA).

Postnatal exposure to clonazepam leads to cognitive deficits in adult rats.
Martin Šubrt, Anna Mikulecká and Hana Kubová (Academy of sciences of the Czech Republic).

Studying the modulation of brain rhythms by dynamic cues.
Diego Lopez-Pigozzi, Julita de la Vega, Lorena Perez, Thomas Gener and Mavi Sanchez-Vives (IDIBAPS, Spain).

Combinatorial measurement of sleep and wheel running activity to examine the interaction between light and drug administration in mice.
Tara LeGates and Samer Hattar (John Hopkins University).

Measuring stress and cognitive load effects on the perceived quality of a multimodal dialogue system.
Andreea Niculescu and Betsy van van Dijk (University of Twente, The Netherlands).

A systematic review on randomization and permutation tests in the educational and behavioral sciences.
Ming Huo, Mieke Heyvaert, Wim Van Den Noortgate and Patrick Onghena (Katholieke Universiteit Leuven, Belgium).

Pattern recognition methods – a novel analysis for the pupillographic sleepiness test.
Jarek Krajewski and Tobias Peters (University of Wuppertal, Germany),
Tom Laufenberg and Barbara Wilhelm (University of Tübingen, Germany).

Group preparedness for risk in the environment of social instability.
Natalja Mihejeva (Daugavpils University, Latvia).

TRACKMATE (v.1.0): A versatile program for automated tracking of behaviour in laboratory rodents.
Esther Remmelink (VU University Amsterdam, The Netherlands),
Michael Bowen, Robert Dielenberg and Iain McGregor (The University of Sydney, Australia) and Paul Halasz (Motion Mensura Ltd, Australia).

TRACKMATE SOCIAL (v 0.9): Beta software for the automated measurement of rodent social behaviour.
Michael Bowen and Iain McGregor (The University of Sydney, Australia),
Esther Remmelink (VU University, Amsterdam), Robert Dielenberg and Paul Halasz (Motion Mensura Ltd, Australia).
The use of wildlife cameras to monitor pig behavior during commercial long distance transport.
Katja van Driel, Richard Heath and Janet Talling, (The Food and Environment Research Agency, UK), Heleen van de Weerd and Peter Kettlewell (ADAS UK Ltd.).

An automated tracking algorithm for quantitative group behavior studies.
Haishan Wu (Fudan University, China).

The compensatory tracking task: a pattern recognition based approach for classifying vigilance
Corinne Schenka, Thomas Schnupp, Christian Heinze, Jarek Krajewski and Martin Golz (FH Schmalkalden, Germany).

PhenoMaster: automated homecage system for studying behavior in neurodegenerative rodent models
Esteban Portal, (University of Tübingen, Germany).

The BacHD rat: A new rat model of Huntington’s disease expressing the full-length mutant huntingtin.
Laura Emily Clemens, Libo Yu, Esteban Portal, Jasmin Ehrismann and Huu Phuc Nguyen (University of Tübingen, Germany).

Crowd safety architecture - measuring levels of safeness.
Maarten Douwe Bredero (Architect Maarten Douwe Bredero, The Netherlands).

Free exploration of an elevated plus-maze in mice.
Vincent Roy (Université de Rouen, France).

Work units in tutorials software for learning mathematics.
Laurent Souchard (University of Paris Diderot, France).
Measuring Behavior 2010 - Eindhoven, The Netherlands
Demonstration showcase
Demonstration showcase

In the Demonstration Showcase a prototype of a measuring device or technique, beta version of new software or recently launched product can be shown. The demonstrations take place either next to a related poster or in one of the seminar rooms adjacent to the poster area in the lobby. The demonstrations will be shown on Thursday 26th August 14:00 - 15:40 and 16:10-17:30.

The following Demonstrations are held during the conference:

- BeFly! - a wizard driven behavioural analysis tool (page 71)
- Mobile Sensors for Measuring Physical Activity Behavior (page 75)
- ELAN - multimedia annotation tool (page 76)
- Trackmate (v.1.0): a versatile program for automated tracking of behaviour in laboratory rodents (page 77)
- Trackmate social (v 0.9): beta software for the automated measurement of rodent social behaviour (page 79)
- MyExperience – A Solution for Psychological and Behavioral Monitoring (page 81)
- Eagle Eye: people tracking with network of stereo cameras (page 82)
- uLog 3.1: a new tool for logging and analyzing user behavior (page 83)
- I-CubeX (page 85)
- NeuroLogger (page 86)
- Ambulatory measurement and analysis of posture & motion and other physiological signals: the VitaMove system (page 87)
- Visualizing group dynamics signals (page 88)

There will be an award for the best demonstration. Please see page 165 for your voting form.
BeFly! - A Wizard Driven Behavioural Analysis Tool

Date: Thursday, August 26
Time: 14:30 – 15:00
Location: Zernike
Presenter: Edward Green (University of Leicester, United Kingdom)

Abstract
Measuring Drosophila activity using TriKinetics equipment has become an integral part of research into neurodegeneration, sleep disorders and circadian rhythmicity. Different groups use disparate techniques to analyse activity data, however - in general - these packages have poor graphical output capabilities and/or restrictive requirements on the format of input data that make them difficult to use.

BeFly! is a new software package running within Microsoft Excel designed for ease of use. By using a wizard driven approach to generate dynamic graphical outputs, novice users can interrogate activity data from any organism more rapidly, and in greater depth, than when using other software solutions.

Author Keywords: Activity Analysis, Neurodegeneration, Circadian, Sleep, TriKinetics.

Although many behavioural paradigms exist, automated activity analysis using activity monitors has become a standard procedure for groups researching circadian rhythmicity [1], sleep [2], fitness [3], and neurodegenerative disease progression [4]. TriKinetics activity monitors have become the de facto standard for recording Drosophila activity, while mouse [5] or human [6] activity is generally collected using bespoke telemetry systems.

Activity recorders output data as long sequences of numbers representing an individual's activity per unit of time. Currently this data can be analysed using Matlab scripts [7], Statsoft add-ins [8], C++ programs [9], VBA scripts [2], and most recently using the pySolo Python package [10]. However, these packages remain difficult to learn and use, and often do not generate high quality graphical representations of the results.

The new BeFly! package was designed to be easy to use, provide attractive graphical representation of results, and facilitate the rapid analysis of large datasets. These features make it particularly appropriate for behavioural screening experiments.

To this end, BeFly! is implemented in the Visual Basic for Application coding language, and runs within Microsoft Excel (version 2007 or greater) – a package readily available to most researchers that is well suited for rapid, flexible analysis of the kind of large datasets generated by behavioural experiments.

BeFly! includes a number of tools to help users import data from commonly used activity
recording platforms. Once this experimental data has been imported into Excel, the user must simply select the portion of data to be analysed, summon the BeFly! analysis wizard, and then follow a series of simple steps to determine the analysis parameters. Possible analyses include:

- Sleep – sleep bout number, distribution, total sleep, sleep latency and all other commonly used sleep metrics.
- Health – mean waking activity.

Figure 1. The analysis wizard in BeFly!, designed to be clean, clear and concise.

Figure 2. An example of a dynamic Pivotchart graphic generated by BeFly!. Standard error bars can be toggled on/off, and users can mousover series to dynamically highlight data of interest.
• Circadian – tools to average or regress activity over time to facilitate the comparison of individuals with activity of different periods. BeFly! also includes dedicated modules for the automated analyses of period and phase shift experiments, both of which are very time consuming to analyse using existing methods.

• Signal processing – BeFly! facilitates basic signal processing, including the use of the Butterworth smoothing filter, signal thresholding, and the identification of hyperactive behaviour which may disrupt further analyses.

BeFly! improves upon Excel’s built-in graphical output by adding a number of tools to facilitate the analysis of large scale experiments, including tools to dynamically highlight series on graphs, and correctly calculate standard errors for each point independently.

BeFly!’s simplicity of use represents a significant advance in high throughput analysis of activity data, and should encourage groups not familiar with activity analysis to give it a try. As many genes have pleiotropic effects on behaviour, this may be of interest to a wide range of groups.

During this demonstration I will briefly cover the principals of activity analysis, before performing a run-through of a typical analysis.

References


DEMONSTRATION

Mobile Sensors for Measuring Physical Activity Behavior

Date: Thursday, August 26
Time: 14:00-14:30
Location: Curie
Presenter: Jürgen Stumpp (Movisens GmbH, Germany)

In this demonstration showcase we will show new mobile sensors to record physical activity for the study of human behavior. We will also show prototypes of mobile sensors to record the electrocardiogram (ECG) and the galvanic skin response (GSR). All these measurement systems are developed for psycho-physiological measurements in research applications. They are optimized for the use in studies. Depending on the configuration, the raw signals of Activity (3-axis acceleration), ECG and GSR can be recorded. In the future it will additionally be possible to calculate and record additional features on the sensor (Steps, Activity-Counts, Energy Expenditure, Angle, Heart Rate, Heart Rate Variability). The software for signal recording with a PC allows a flexible adaption to the particular study.
DEMONSTRATION

ELAN - Multimedia Annotation Tool

Date: Thursday, August 26
Time: 15:00-15:30
Location: Zernike
Presenter: Han Sloetjes (Max Planck Institute for Psycholinguistics, The Netherlands)

ELAN is a free annotation tool for (mainly) manually scoring digitized recordings of human and/or animal behaviour. It supports up to 4 simultaneous video streams as the source to be annotated, possibly in combination with timeseries data from motion capture systems. There is support for an unlimited number of tiers (annotation layers) that can be organized hierarchically. ELAN 3.9 improves on the fly coding, operations on multiple files (search, statistics), color-coding, customizable keyboard shortcuts and many other features. ELAN is available for multiple platforms (Windows, Mac OS X, Linux).
DEMONSTRATION

Trackmate (v. 1.0): A Versatile Program For Automated Tracking Of Behaviour In Laboratory Rodents

Date: Thursday, August 26
Time: 16:00-16:30
Location: Ernst
Presenter: Esther Remmelink (VU University Amsterdam, The Netherlands)

An increasing array of commercial software packages allow video tracking and automated analysis of rodent behaviour in standard models such as the elevated plus maze, radial arm maze and conditioned place preference paradigms. Trackmate is a new program developed as a collaboration between Motion Mensura Ltd and the University of Sydney Psychopharmacology Laboratory and can be used to automate data gathering in a wide variety of behavioural paradigms involving rodents. Trackmate is written in the Labview™ programming environment and can be run on any adequately powered PC. Users are required to install Labview RunTime software and Apple Quicktime, both of which are free downloads. The only other requirement is an appropriate USB video grabbing device, many of which are available at very low cost. We typically run the software on MacMini™ computers (2.8 MHz, 4GB RAM, 320 GB hard disk) with KWorld DVD Maker 2™ USB

Figure 1. Screenshot of Trackmate while simultaneously tracking 4 rats in separate cat odour boxes
interfaces. Trackmate allows data to be gathered in real time from up to 4 camera inputs, via an appropriate quad splitter box, allowing 4 individual animals in different apparatus to be tracked simultaneously (see Figure 1). For each animal, a blob (corresponding to the body of the animal) is detected as well as the centre of mass and head direction of the rodent. Up to 4 different regions of interest (ROIs) can be defined for each animal in the apparatus in which they are located. Location and distance travelled by the blob and centre of mass of each animal within each of these ROIs can be measured and logged. "Blob Logic" functions allows sophisticated measures to be made at the intersection of ROIs: for example “head out” behaviour in the emergence test and object investigation in novel object recognition test. Trackmate logs an exhaustive array of test results to Excel compatible spreadsheets and also allows hard disk recording of raw video footage to be made in real time for archival purposes. Travel paths of animals can also be recorded. Trackmate is easy to set up and has been successfully used in various Australian universities to acquire data in a variety of paradigms including: locomotor activity and drug-induced behavioural sensitization, home cage activity, elevated plus maze, open field test, conditioned place preference, novel object recognition, Morris water maze, forced swim test, and predator odour avoidance.
DEMONSTRATION

Trackmate social (v 0.9): Beta Software For The Automated Measurement Of Rodent Social Behaviour

Date: Thursday, August 26
Time: 16:30-17:00
Location: Ernst
Presenter: Michael Bowen (The University of Sydney, Australia)

Many commercial software packages now exist to allow video tracking and automated analysis of behaviour in individual rats and mice across a variety of behavioural paradigms. However, automated analysis of social behavior in pairs, triplets or quads of rodents is technically much more challenging and has proved difficult to successfully achieve. At the same time, there is increasing interest in psychopharmacology, psychology and neurobiology to characterise the effects of gene manipulations, stressful interventions and drug treatments on sociability in rodents. Trackmate Social is a new program under development as a collaboration between Motion Mensura Ltd and the University of Sydney Psychopharmacology Laboratory and is being used to automate data gathering and analysis of social interaction in rats and mice. Trackmate Social is written in the Labview™

Figure 1. Screenshot of Trackmate Social logging anogenital investigation in an unfamiliar pair of rats
programming environment and can be run on any adequately powered PC. Users are required to install Labview RunTime™ software and Apple Quicktime™, both of which are free downloads. The only other requirement is an appropriate USB video grabbing device, many of which are available at very low cost. We typically run the software on MacMini™ computers (2.8 MHz, 4GB RAM, 320 GB hard disk) with KWorld DVD Maker 2™ USB interfaces. Trackmate Social can be used to analyse social behaviour in groups of 2-4 rats or mice (see Figure 1). For each animal in the group, a blob (corresponding to the body of the animal) is detected as well as the centre of mass and head direction of each individual rodent. The distance between blobs over time is automatically computed allowing proximity measures and time spent in dyads, triplets or quads to be derived. Various regions of interest can also be defined in the test environment, allowing time spent by social groups in specific regions to be measured. Trackmate Social logs an exhaustive array of test results to Excel compatible spreadsheets and also allows hard disk recording of raw video footage to be made in real time for archival purposes. Ongoing research and development is aimed at automating the detection of specific social behaviours such as adjacent lying, anogenital sniffing (see Figure 1), head to head exploration and chasing/following. Trackmate Social has recently been used in a variety of experiments, including (1) demonstrating increased huddling behaviour in groups of rats exposed to predator odor and other stressors, (2) showing decreased social interaction in adolescent rats given chronic paroxetine, and (3) showing increased anogenital investigation in unfamiliar compared to familiar rats in the social interaction test.
**DEMONSTRATION**

**MyExperience – A Solution for Psychological and Behavioral Monitoring**

Date: Thursday, August 26  
Time: 14:30-15:00  
Location: Curie  
Presenter: Jürgen Stumpp (Movisens GmbH, Germany)

In this demonstration we will show an overview of hand-held computer software solutions for psychological and behavioral monitoring. With this demonstration we want to provide a forum in which we can discuss the open-source MyExperience software as a solution for Psychological and Behavioral Monitoring. MyExperience is a context-aware data collection platform for capturing objective and subjective data as it is experienced. The MyExperience project was started by Intel Research, Seattle and the University of Washington in the spring of 2005. During the last year we ported the Platform to newer mobile phones and made several improvements and extensions which we would like to discuss with the participants. We would like to know if MyExperience fits the needs of the researchers in the field of behavioral monitoring and want to discuss further developments of MyExperience.

We would like to do a small presentation on how MyExperience works and how it can help researchers in different fields to do studies with it. Also we would like to show how we improved MyExperience to be a complete solution for behavioral monitoring. We will bring a functional prototype that demonstrates the current development state and how MyExperience can be used in combination with mobile sensors that monitor physiological signals and triggers questionnaires on the hand-held computer.
**DEMONSTRATION**

**Eagle Eye: People Tracking With Network Of Stereo Cameras**

**Date:** Thursday, August 26  
**Time:** 14:00 – 14:30  
**Location:** Lorentz-Zeeman  
**Presenter:** Arend van de Stadt (EagleVision, The Netherlands)

EagleEye 3D camera units can be combined together in a grid which becomes a powerful and scalable platform. Each unit calculates the tracks of persons and passes it onto its neighbors. In that way, a wide area can be monitored.

The tracks can be inputs for several People Logistics applications to detect events and optimize, people, processes and information flows.

More information about this system will be presented in the workshop on Measuring Behavior in Forensic Research and Prevention of Crime on Thursday morning.
**Demonstration**

**uLog 3.1 – A New Tool For Logging And Analyzing User Behavior**

Date: Thursday, August 26  
Time: 16:30-17:00  
Location: Zernike  
Presenter: Hans Theuws (Noldus Information Technology, Wageningen, The Netherlands)

**Introduction**

uLog™ is a tool for automatically recording user-system interaction. With uLog it is possible to log events such as:

- **Pointing devices** – These are events carried out with, for instance, a mouse, trackball, or touchpad, such as clicks, double clicks, and wheel movement.
- **Keyboard events** – Events such as single key presses and strings (i.e., text entered by the user).
- **Menu events**, such as menu created/opened/selected/closed.
- **Window events**, such as window opened/activated/moved/resized/closed/title changed.
- **Other events**: scroll/cut, copy, paste/ invoke command /maximize, minimize.

Besides applications, windows, and events, uLog also records:

- x- and y-coordinate of mouse button pressed/released (in pixels),
- relative distance (shortest distance between locations where mouse button is pressed and released),
- total distance (distance the mouse pointer has traveled between mouse button pressed and released),
- rate (ratio relative distance : total distance, a number between 0 and 1).

**Data reduction in uLog 3.1**

One of the main issues when working with a tool like uLog, is the large amount of data that is being collected. Therefore, Noldus is now working on a new version of uLog, including functionality for reducing the large number of logged events by automatically detecting high level user events. For example:

1. Individual keystrokes can be logged as a user action state (to indicate keyboard usage instead of logging individual keystrokes).
2. In a similar way, individual mouse actions can be logged as one state.

3. A break between two ‘user events’ can be logged as ‘hesitation’.

4. Other actions, e.g. Delete or Backspace, or two contradicting actions, can be logged as ‘difficulty’.

5. Logs can be imported directly into The Observer, where one can analyze and visualize how long a certain application has been used by the test participant.

Other new functions in this software include:

- log hovering behavior,
- add control snapshots to the output,
- different output formats,
- standalone version,
- compatible with Windows Vista and Windows 7.

During this session, we will demonstrate a prototype of uLog3.1.

**Audience**

This demonstration is relevant for researchers and practitioners involved in human computer interaction research, as well as developers of technology and tools for measuring user behavior. As such it will also provide an opportunity for exchanging information about the opportunities, challenges and needs in the fast developing area of human computer interaction research.
DEMONSTRATION

I-CubeX

Date: Thursday, August 26
Time: 14:00-14:30
Location: Ernst
Presenter: Axel Mulder (infusion systems Ltd., Canada)

The I-CubeX demonstration will show how I-CubeX sensors (see http://ICubeX.com) can help both automating the coding of behaviour as well as reducing ambiguity in such coding. The sensors can capture human actions such as a change in proximity to a computer screen, position/posture on a chair, speed and proximity of passing by a location, whether or not a hand has grabbed an object, etc.. These actions are then automatically entered into behavioural coding software, thereby voiding the need to do so afterwards by analysing the video material, and hence saving time. Assuming the behaviour of interest is defined as binary it is necessary to define when sensors are triggered, hence increasing the specificity of the behaviour of interest and reducing ambiguity in the behaviour coding. Regardless, I-CubeX sensors output high resolution analog signals continuously, which can also be recorded as a representation of the behaviour. The I-CubeX product line comprises many sensors that capture a wide variety of human actions, and allow for easy instrumentation of the experimental environment. A specific example with a number of sensors interfaced to a computer running either Noldus’ The Observer and/or TechSmith Morae will be shown in operation, capturing typical human behaviour during consumer - product interaction.
DEMONSTRATION

NeuroLogger

Date: Thursday, August 26
Time: 15:00-15:30
Location: Curie
Presenter: Dimitrula Arabadzisz (Institute of Anatomy, University of Zurich)

Abstract
The study of seizure initiation, spreading and termination is central in the epilepsy research field. For this, synchronous recordings of the epileptic behavior and brain activity are essential. The cable free, non-telemetric NeuroLogger® system is suitable for such synchronized electrophysiological and video recordings in mice. The NeuroLogger® is a microchip (16 bit MSP430 32 kb Flash, 1kb RAM processor; UART) with 750 kbit/s service interface. It is powered by two 1.4 V hearing aid Zink-air batteries and weighs about 2.8 g. It has 4 EEG channels, each sampling up to 500 Hz, 2 reference channels, 1 passive rolling ball as movement detector, and 1 synchronization channel for event marking and/or synchronizing the EEG record with behavioral records like video monitoring. The inputs to the NeuroLogger® are unity gain buffered with the AC input range of +/- 750 µV, the four EEG channels have 1000x gain and are band-pass filtered 1-70 Hz. ADC resolution is 8 bit. Electrophysiological data is stored in hexadecimal format and can be converted either to the Spike2 (CED, UK) compatible file format (smr) or to the MatLab compatible file format (mat). Here we used the NeuroLogger® system for recording seizure activity in Synapsin I-/II- double-knock-out mice synchronously with video recording of the seizure behavior in order to create a tool for finding specific brain activities underlying specific elements of seizure behavior.

Keywords
freely moving, EEG, synchronized video recording, mutant mice
DEMONSTRATION

Ambulatory Measurement and Analysis of Posture & Motion and Other Physiological Signals: The Vitamove System

Date: Thursday, August 26
Time: 14:30-15:00
Location: Ernst
Presenter: Johannes (Hans) B.J. Bussmann (Dept. of Rehabilitation Medicine & Physical Therapy, Erasmus MC University Medical Center Rotterdam, The Netherlands)

The topic of this demonstration is a new development in the field of posture and movement registration/classification, the VitaMove posture&movement and ExG-recorder. VitaMove basically consists of only two recorders, which are worn on the chest and leg, allowing the patient to be minimally affected. Expansion beyond the two initial recorders is possible allowing for more in depth research to take place.

In medicine, many patients have disorders which have or might have consequences on the performance of postures and movements in their daily life. People are insufficiently active, perform their postures and movements in a disturbed way, or with a higher level of strain. But also in the general population, in ergonomics, physical therapy and in sports these aspects of human behaviour are of great interest. Information on actual performed postures and motions can be used to evaluate therapy, to diagnose, to guide therapists and coaches in their provided interventions, or to facilitate the interpretation of other signals.

The Dept. of Rehabilitation Medicine & Physical Therapy of Erasmus MC University Medical Center Rotterdam, The Netherlands, has a long history in the area of prolonged accelerometry-based ambulatory measurement of postures and motions. Numerous studies in a variety of populations have demonstrated the added value of posture and motion measurement. In these studies an Activity Monitor was used that consisted of multiple body-fixed accelerometers, with a wired connected with a portable data recorder.

Recently, this device underwent a considerable update which resulted in the VitaMove system. VitaMove is an ambulatory monitoring system that measures, stores and automatically analyzes multiple physiological signals for periods of up to one week. It enables accurate tracking and objectifying of patient behavior during daily life situations. The VitaMove can be worn inconspicuously underneath existing clothing. Daily activities can be classified, utilising the included software as any of the large number of unique posture and movement classifications including walking, running, sitting, lying down (on side/back/prone), cycling, driving and walking up and down stairs. This creates an objective image of the patient’s day to day activities on a second to second basis. Besides postures and movements, VitaMove tracks ECG/EMG/EEG/EOG, heart rate variability (HRV), temperature, respiration and light.
Visualizing Group Dynamics Signals

Date: Thursday, August 26
Time: 15:00-15:30
Location: Ernst
Presenter: Erik Kuijpers (GGz Eindhoven, The Netherlands)

Abstract
The group dynamics visualizer is a solution to the problem healthcare workers are facing when working with social therapeutic groups. It is a well known problem that their reflection ability is affected negatively by the group dynamics. Healthcare workers become part of this groups dynamics and are no longer able to objectively observe and intervene. In this paper we describe the process of measuring group dynamics, a part of the ‘group prevention plan’; more specific, giving feedback on the tension level of groups inside a psychiatric ward. A software application, ‘group dynamics visualizer’, is developed to measure and visualize the data. The visualization methods allow the user to quickly explore the data in order to find relations and abnormalities. This information is then used to prevent high-tension build up. Furthermore the software serves as an objective observation tool.

Background
By measuring and using group dynamics signals the healthcare worker is able to predict and prevent aggressive patient behavior within psychiatric units. Experience learns that if tension increases within a group of patients, the staff’s reflection abilities are affected. A prevention plan supports the reflection abilities of the health care worker. This makes a collective intervention possible even when tension in the group continues to stay at a high level. Doing so, the autonomy of the staff increases. This prevention plan based on group dynamics signals consists of two parts.

1. A written part called ‘group prevention plan’ in which signs and signals of tension build up are described, including interventions based on de-escalation of the patient group and support of the staff.

2. An instrument which measures the tension building called ‘Grid’. This is an important element because the health care workers themselves are part of or influenced by this tension building. So this Grid is an important objective monitor.
Tutorials
Tutorials

Whereas the general presentations at the conference deal with new and innovative methods in behavioral research, tutorials focus on teaching existing methods. Tutorials provide a valuable opportunity to instruct participants of *Measuring Behavior 2010* in specific methods, techniques and equipment for behavioral research. Tutorials consist of both theory and demonstrations and they cover a wide range of topics related to methods, techniques and equipment used in behavioral research.

Most tutorials are on the Tuesday, but because of the large number of tutorials, several are on other days during the conference.

The following Tutorials are presented during the conference:

- Assessing consumers' attention with remote eye-tracking device: methodology of the experiment from a to z (page 92)
- Remote physiological monitoring via implantable telemetric devices (page 93)
- Advanced EthoVision XT (page 94)
- The MotoRater: A new, standardized testing system for quantification of locomotor impairment in rodents with CNS damage (page 95)
- Advanced Trial and Hardware Control in EthoVision XT (page 96)
- The IntelliMaze: measuring cognitive ability and behavioral phenotype in a social home-cage setting (page 97)
- Analyzing Behavior and Interactions with Theme: Detection and Analysis of Hidden Temporal Patterns (page 99)
- Pavlovian conditioned freezing: practical tutorial (page 100)
- Analysis of behavior using operant conditioning methods (page 101)
- ExpertEyes: Open Source eye-tracking (page 103)
- The Observer XT and physiological data (page 105)
- Designing eye tracking experiments to measure human behavior (page 106)
- Making video recordings for use in behavioral research (page 107)
- Data selection, organization, export and handling with MS Excel in The Observer XT and EthoVision XT (page 109)
- Psychophysiology Applications using a BIOPAC MP System (page 110)
- BIOPAC Electrodermal Activity (EDA) Analysis (page 112)
- Integrating real-time physiologic monitoring using Mindware and the Observer XT (page 114)
- Eye-tracking systems - user’s dilemma in choosing the right solution. Need-Promise-Delivery: an overview (page 115)
- The Observer XT in HCI research (page 116)
TUTORIAL

Assessing Consumers’ Attention With Remote Eye-Tracking Device: Methodology of the Experiment From A To Z

Date: Tuesday, August 24
Time: 16:00-17:30
Location: Zernike
Instructor: Svetlana Bialkova (Marketing and Consumer Behavior Group, Wageningen University, The Netherlands)

Benefits
This tutorial will give you an insight how to design and run a good experiment for capturing consumers attention with Remote Eye-tracking Device (RED) and you will learn different techniques for analyzing the experimental results.

Features
The methodology of designing and running an experiment using RED will be presented. Participants will be introduced to: how to work with RED, how to make a good calibration, how to properly display stimulus material, how to capture the gaze (some tips and pitfalls will be discussed), how to analyze the results, proper save and export of data for further analyses e.g., in SPSS.

Audience
This tutorial is targeting novices or experts in consumer research who are interested to learn how to use eye-tracking devices as effective experimental tools for measuring consumer behavior.

Instructor’s resume
Svetlana Bialkova holds a PhD in Social Sciences and currently is a researcher at the Marketing and Consumer Behavior Group, Wageningen University. In her career, she was working on numerous projects at different international labs: Donders Institute for Brain Cognition and Behavior, Nijmegen, The Netherlands; Central and Eastern European Center for Cognitive Science, Sofia, Bulgaria; Department of Experimental Psychology, University of Bristol, UK.
TUTORIAL

Remote Physiological Monitoring Via Implantable Telemetric Devices

Date: Tuesday, August 24
Time: 14:00-15:30
Location: Curie
Instructor: Anne Brumagim (Data Sciences International (DSI), USA)

Benefits
This tutorial will present current techniques and materials available to collect data from free moving animals via implantable radio-telemetry devices developed and manufactured by Data Sciences (DSI).

The DSI implantable telemetric devices allow researchers to collect data parameters such as: Temperature, Pressure (blood pressure, bladder, intra-ocular, left-ventricular, etc), Bio-potential signals (ECG, EEG, EMG, EOG), Respiration Rate, and Motor Activity, etc.

Features
This tutorial will review:

- The basic techniques for surgical implantation of the telemetric devices.
- Considerations for system set-up.
- New products for large and small animals.

Audience
This tutorial is intended for a general basic presentation of the telemetry products and overview of the surgical techniques.

Instructor’s resume
Anne Brumagim has been a sales representative for 20 years with Data Sciences International.
T U T O R I A L

Advanced EthoVision XT

Date:  Friday, August 27
Time:  14:00-15:40
Location:  Ernst
Instructor:  Fabrizio Grieco (Noldus Information Technology, The Netherlands)

Benefits
In this tutorial you will learn about several new features of EthoVision XT 7.

Features
Participants will be introduced to:

1. Tracking multiple animals per arena: an example with a social interaction test
2. New tracking methods: Differencing
3. Advanced detection settings
4. Manual event recorder
5. Advanced trial control using routines: an example with a learning experiment
6. Using trial control routines also to analyze data
7. Visualizing behavior changes together with tracks
8. Statistics for social interaction tests

Audience
This tutorial is intended for novice or experienced users of EthoVision XT. Basic understanding of EthoVision XT and video tracking in general is required.

Instructor’s resume
Fabrizio Grieco has a PhD in animal behavior. He is a documentation specialist and trainer for Noldus Information Technology.
TUTORIAL

The MotoRater: A New, Standardized Testing System For Quantification Of Locomotor Impairment In Rodents With CNS Damage

Date: Tuesday, August 24
Time: 11:00-12:30
Location: Ernst
Instructors: Linard Filli (Brain Research Institute, University of Zurich, Switzerland)

Benefits
In this tutorial, the participant will learn about a new, all-inclusive testing system allowing quantitative, detailed and standardized analysis of locomotor performance in rodents with CNS damage.

Features
The participants will be introduced to behavioral and technical details of the MotoRater. The testing box/basin itself with its insertion elements will be explained in detail. Recording and tracking of the animal's locomotion and its evaluation by the software will be described. Moreover, parameters of locomotion tested in the different locomotor tasks will be discussed.

Audience
This tutorial is aimed at all researchers dealing with behavioral, locomotor testing in rodents after CNS damage.

Instructor's resume
Linard Filli is a PhD student working in the lab of Professor M.E. Schwab at the Brain Research Institute of the ETH/University of Zurich. His research interests focus on neural structural plasticity underlying functional locomotor recovery in rats after spinal cord injury.
TUTORIAL

Advanced Trial and Hardware Control in EthoVision XT

Date: Tuesday, August 24
Time: 09:00-10:30
Location: Ernst
Instructor: Jason Rogers (Noldus Information Technology Inc, USA)

Benefits
In this tutorial you will learn how to use the Advanced Trial and Hardware Control Module as it relates to particular applications of behavioral research, such as electrophysiology, conditioning, and maze behavior in rodents, insect behavior, etc.

Features
Participants will be introduced to:

• automated animal tracking.
• multiple body point tracking.
• integration of EthoVision XT with hardware.
• advanced analysis of hardware events and/or states, as well as data export.

Audience
This tutorial is intended for researchers who are interested in automated tracking and/or novice-to-experienced users of EthoVision XT who would like to work with automated paradigms. Basic understanding of tracking software is required.

Instructor’s resume
Jason Rogers is an Application Specialist for Noldus Information Technology, Inc. He earned a Ph.D. in experimental psychology in 2005. Before joining Noldus Information Technology, Jason was a Post Doctoral Fellow at the Medical University of South Carolina, USA, where he used EthoVision XT to characterize behavioral deficits in rats with a history of methamphetamine use.
**TUTORIAL**

**The IntelliMaze: Measuring Cognitive Ability And Behavioral Phenotype In A Social Home-Cage Setting**

Date: Tuesday, August 24  
Time: 09:00-10:30  
Location: Lorentz-Zeeman  
Instructor: Dr. Sven Krackow (NewBehavior AG, Zurich, Switzerland)

**Benefits**

During this tutorial, the interested novice as well as the researcher already using (parts of) the system, such as the IntelliCage, can benefit from at least:

- The outline of the IntelliMaze that exposes its vast range of experimental designs and research topics.
- The hands-on exemplification of the experimental usage of the system which alludes to its power and flexibility of experimental conduct and analysis.

**Features**

The tutorial will focus on:

- Overview of the IntelliCage system and its potential as well as already published usages.
- General logic of experimental protocol definition and, hence, range of scientific questions that could be explored.
- Conduct of experimental runs, including hands-on demonstrations and audience-discussion of any aspect of the system.
- Principal data analysis strategy and examples.

**Audience**

Anybody who intends to or is conducting standardized behavioral experiments in mice, in the phenotyping context and particularly when interested in cognitive/learning aspects, would profit from an exploration into the IntelliCage/IntelliMaze. The non-novice will certainly also profit from expanding existing knowledge on the system’s usability, and particularly from hints at data analysis design - apart from the opportunity to discuss questions of particular interest that will be taken from the audience. There will be no requirement regarding a priori knowledge other than a strong interest in standardized behavioral testing of lab rodents and the motivation of using automated, computerized behavioral tools based on RFID-tagged animals.
Instructor’s resume
Dr. Sven Krackow has extensive experience in standardized behavioral testing of house mice as a behavioral biologist originally working in sociobiological contexts. During recent years he spent considerable time validating and testing designs with the IntelliCage and its Addons as well as analysing large data-sets acquired in EU-project collaborative studies using modern statistical tools.
TUTORIAL

Analyzing Behavior and Interactions with Theme: Detection and Analysis of Hidden Temporal Patterns

Date: Tuesday, August 24
Time: 09:00-10:30
Location: Planck
Instructor: Magnus S. Magnusson (Human Behavior Laboratory, University of Iceland & COB, PatternVision, Iceland)

Benefits
You will acquire understanding and skills regarding the analysis of behavior and interactions seen as the intra- and inter-individual construction and repetition of a particular type of (typically) hidden temporal patterns called t-patterns.

Features
Participants will learn:

- About the use of this methodology and technology through presentation of example studies from both human and animal research.
- How to analyze behavioral and interaction patterns you have detected and answer various questions about their content, complexity, meaning and functional aspects.
- To detect how structure in behavior and interactions may depend on independent variables such as, for example, age, sex, tasks or experimental treatment.
- About the features planned for Theme 6.

Audience
Intended for researchers interested in the possibilities for new kinds of insights into the structure and function of human and animal behavior as well as the detection of effects of experimental and environmental factors on the structure of behavior.

Instructor’s resume
Magnus S. Magnusson is research professor and director of the Human Behavior Laboratory, University of Iceland. He is the creator of the t-pattern model and the Theme software, which he has developed and applied over more than 25 years during research at psychological, ethological and anthropological laboratories of European universities including Copenhagen University, the University of Paris (V, VIII & XIII) and the National Museum of Natural History, Paris. Besides a long standing collaboration with researchers at The University of Chicago, he now also works with researchers at the University of Arizona, the University of California at Irvine and The Babraham Institute (University of Cambridge) and has lectured and organized workshops in the USA, Japan, and Europe. He is the founder and chairman of PatternVision Ltd.
TUTORIAL

Pavlovian Conditioned Freezing: Practical Tutorial

Date: Tuesday, August 24
Time: 16:00-17:30
Location: Ernst
Instructor: Professor Stephan Anagnostaras (University of California, San Diego, USA)

Benefits
Specific experimental paradigms used in the study of basic learning and memory pathways will be discussed, with special emphasis on the role of the amygdala, hippocampus, and neocortex in fear conditioning. Participants will learn specifics about instrumentation and experimental protocols that are employed by leading researchers in the field of fear conditioning.

Features
Participants will be exposed to current leading theories pertaining to formation of fear-provoking memories. The use of experimental techniques to explore areas such as memory consolidation and phobia will be discussed. Experimental applications using the state-of-the-art digital video based fear conditioning system from Med Associates, Inc. will be the basis of the practical part of the workshop, but will be applicable to all who wish to enter the field.

Audience
This workshop is aimed at basic scientists who desire fundamental understanding of current theories in fear conditioning and the role of the hippocampus in memory consolidation, as well as practical applications of the paradigm. No prior knowledge of fear conditioning techniques, psychology, or neuroscience is assumed. There is no limit, other than room capacity, to the number of participants.

Instructor’s resume
Dr. Anagnostaras is a leading authority on Pavlovian fear conditioning, and has been working with the paradigm for 17 years. He received his PhD at UCLA under the mentorship of Dr. Michael Fanselow, and did post-doctoral work with Dr. Alcino Silva. He is an Associate Professor at UCSD. The general aim of Dr. Anagnostaras’ research is to combine the molecular-genetic, systems, and cognitive-behavioral levels to understand how the brain produces behavior and cognition. A major emphasis in this endeavor is bridging systems and molecular approaches using hippocampus-dependent learning, in particular, learning about context. The hippocampal-neocortical memory system offers an excellent opportunity in which the molecular and cognitive levels may be first plainly joined. Long-term objectives of Dr. Anagnostaras’ research are to advance our understandings of the mechanisms of memory, cognition, and drug addiction.
TUTORIAL

Analysis of Behavior Using Operant Conditioning Methods

Date: Tuesday, August 24
Time: 14:00-15:30
Location: Planck
Instructors: Professor Steven Dworkin (Western Illinois University, USA) and Mr. Karl R. Zurn (Med Associates, Inc., St. Albans, USA)

Benefits
In this tutorial, participants will gain an understanding of basic considerations and applications using operant conditioning methods for examining mechanisms of learning and memory. State-of-the-art behavioral analysis methods and instrumentation will be addressed. Participants will be exposed to MED-PC® behavioral analysis software and the associated experimental control state language, Med State Notation™, from Med Associates, Inc.

Features
Basic theories of learning and memory will be discussed, with a focus on how operant conditioning methods can be utilized to gain in depth understanding of underlying cognitive processes, as pioneered by B.F. Skinner. Particular emphasis will be given to the use of the MED-PC® behavioral analysis software, and the use of various stimulus-response contingencies in the experimental analysis of behavior. The basics of behavioral pharmacology including drug discrimination and drug self-administration will also be discussed. Moreover suggestions for integrating behavior and neurobiology will be presented.

Audience
This workshop is aimed at basic scientists desiring more exposure to current methodologies employed in the experimental analysis of behavior. No prior knowledge of MED-PC® is required. There is no implicit limit to the number of participants.

Instructors’ resume
Dr. Dworkin has established international recognition for his research on the neuropsychopharmacology of abused substances. He has received both private and NIH funding and has published extensively in several areas including behavior analysis, behavior pharmacology and the neuroscience of addiction. Dr. Dworkin is a fellow of the American Psychological Association and a member of ASPET, CPDD, the Society for Neuroscience and ABA International. He has reviewed manuscripts for the major journals in the field and served on NIH and NIDA study sections.

Mr. Zurn has a Masters Degree in Electrical Engineering from Villanova University. He
founded Med Associates in 1971, and the company has since become one of the leading suppliers of instrumentation, including software and hardware, for behavioral researchers all over the world.
TUTORIAL

ExpertEyes: OpenSource Eye-tracking

Date: Friday, August 27
Time: 14:00-15:40
Location: Planck
Instructors: Tom Busey (Psychological & Brain Sciences Department, Indiana University, USA)
Francisco J. Parada (Psychological & Brain Sciences Department, Indiana University, USA)

Benefits
In this tutorial you will learn how to collect and analyze eye tracker data using our open source software. Our proposed system is flexible in terms of input of data streams, can be used as a stationary or portable eye tracking station. The user has full control of all the aspects of the analysis since the code is open for modification.

ExpertEyes is independent from hardware, free to use and modify. The offline analysis mode, allow the user to go back and fix noisy data.

Features
In this tutorial you will learn:

• Eye-tracking basics.
• How to collect eye-tracker data
• The overall structure of our open source software.
• The kind of data that can be processed by our software.
• How to use the graphic user interface to explore and process data.
• How to use the different features included in the present version.
• How to get very good quality data and fix corrupted or noisy eye-tracker data.
• How to report bugs or suggestions to the developers.
• How to create an efficient analysis path for eye-tracker data.

Audience
Our tutorial will be a ‘hands-on’ activity; this means that the participants will collect and analyze data during the tutorial. The use of individual laptops is highly recommended. The tutorial will be divided in two parts:

1. Theoretical Part (about 30 minutes): We will go through the basics of eye tracker data
collection and analysis. The speaker will show how our system works and what are the main features included in the present version of our software.

2. ‘Hands on’ Part (about 60 minutes): Workgroups will be formed and the speaker will provide each group an eye tracker hardware to work with. Each group will collect and analyze data.

Instructors’ resume

Tom Busey is a Professor in the Psychological & Brain Sciences Department at Indiana University, USA. He has a PhD from the University of Washington, USA.

Francisco J. Parada is a Psychology & Neuroscience PhD student in the Psychological & Brain Sciences Department at Indiana University, USA.
TUTORIAL

The Observer XT and Physiological Data

Date: Thursday, August 26
Time: 11:10-12:30
Location: Zernike
Instructor: Patrick Zimmerman (Noldus Information Technology, The Netherlands)

Benefits
In this tutorial you will learn how to use The Observer XT 10 with physiological data, from data acquisition to analysis and export of data.

Features
Participants will be introduced to:

- Setting up a project in The Observer XT 10.
- Acquisition and automatic synchronization of observational and physiological data.
- Importing physiological data into The Observer XT 10.
- Manual synchronization of physiological and observational data.
- Selecting, analyzing and exporting observational and physiological data.

Audience
This tutorial is of interest to anyone who wants to collect observational and physiological data. We assume a basic understanding of The Observer XT.

Instructor’s resume
Patrick Zimmerman is a behavioral biologist with extensive experience in the study of animal learning, behavior, and welfare. He obtained his PhD at Wageningen University (The Netherlands) after which he moved to the UK to work as a post-doctoral researcher at the University of Bristol. Since 2005 he is a documentation specialist and trainer at Noldus Information Technology. His expertise includes behavior analysis, integration of behavioral and physiological data, and gait analysis in rodents.
TUTORIAL

Designing Eye Tracking Experiments To Measure Human Behavior

Date: Tuesday, August 24
Time: 14:00-15:30
Location: Ernst
Instructor: Ricardo Matos (Tobii Technology AB, Sweden)

Benefits
Experimental design is a fundamental step in any type of scientific research, and experiments involving eye tracking are no exception. A well designed experiment allows the researcher to be able to validate and answer the questions of interest. In this presentation I will give an introduction to good practices when designing eye-tracking experiments using remote eye trackers (i.e. Tobii Eye Trackers and Tobii Studio).

Features
Participants will be introduced to experimental design issues related to eye tracking experiments: how to deal with experimenter, subject and task bias; independence of measures; limitations in human perception and eye physiology; type of data collected by a remote eye tracker and data analysis.

Audience
This tutorial is intended for novice or experienced users of remote eye tracking systems, as well as for those who have never used eye tracking before but want to have an introduction to eye tracking methodology.

Instructor's resume
Ricardo Matos is a documentation specialist and trainer for Tobii Technology. He has a PhD in animal behavior research. Before joining Tobii Technology, Ricardo was a post doctoral research fellow at the University of Copenhagen, Denmark.
TUTORIAL

Making Video Recordings For Use in Behavioral Research

Date: Thursday, August 26
Time: 16:00-17:00
Location: Planck
Instructor: Bill Budenberg (Tracksys Ltd, United Kingdom)

Benefits
In this tutorial you will learn about, and see examples of, how to make video recordings for use in research. We will discuss solutions using video cameras, network cameras, tape camcorders, hard disk camcorders, memory card camcorders, and computers. The different solutions will be discussed with reference as to how easy it is to collect the video recordings, how much storage capacity is required, their quality (both spatial resolution and time resolution), their power requirements, associated audio recordings, and their cost. Particular reference will be made to the ultimate use of the videos in both The Observer and EthoVision.

Features
The tutorial will start with a discussion of what video is, and how it is now digitally based, rather than being an analogue signal. Topics covered will be around lighting, fields and frames, exposure times, frame rates, resolutions, recording rates, recording formats, codecs, and what to be wary of when assessing offerings.

There will then be a discussion of what is required for the research that is being carried out. This will work out whether video is appropriate, and allow an appropriate type of video to be chosen by the researcher – higher quality and higher cost may not be the sensible option!

A useful system needs to be able to make recordings that a researcher can actually use easily for his/her observations. Many systems may provide good recordings that can be viewed within the recording system, but cannot easily be used in third party applications such as Windows Media Player, The Observer or EthoVision. Solutions will be demonstrated and recommended for a variety of different circumstances – these will include high speed video, computer screen capture, portable capture, 4 camera high quality capture, and low frame rate recordings from up to 16 cameras at once.

Audience
This tutorial is intended for novice or experienced behavioral researchers who make, or intend to make, use of video in their research. No existing knowledge is assumed.

Instructor’s resume
Bill Budenberg took his first degree in Applied Biology, graduating in 1986 from Cambridge
University. He then studied honeydew as a kairomone for cereal aphid parasitoids at Rothamsted, and gained his PhD from Imperial College, London. He then worked at ICIPE, Nairobi, Kenya for 3 years, establishing evidence for banana weevil pheromones and kairomones, and identifying (with others) some of the compounds. In 1993 he started Tracksys Ltd as the UK and Ireland distributor for Noldus Information Technology, and the company now represents other suppliers of behavioural research software as well. It is this experience working with a wide range of researchers over many years that forms the basis of his knowledge of video recording technology, from a practical user-focussed approach.
TUTORIAL

Data Selection, Organization, Export and Handling With Microsoft Excel in The Observer XT and EthoVision XT

Date: Tuesday, August 24
Time: 16:00-17:30
Location: Curie
Instructor: Wilant van Giessen (Noldus Information Technology, USA)

Benefits
This tutorial is aimed at users of EthoVision and The Observer who want to better organize, manage and analyze their data using Excel.

Features
Participants will be introduced to:

• the settings in EthoVision XT and The Observer XT that affect data export to and data management in Microsoft Excel.

• the use of ‘AutoFilter’ to explore and gain more insight into data sets.

• using ‘Pivot Table’ and ‘Pivot Chart’ reports to organize, visualize, and explore data.

• the use of ‘Conditional Formatting’ to gain clarity and to easily detect errors and outliers.

• miscellaneous ‘tips and tricks’ in MS Excel.

Audience
Users of EthoVision XT and The Observer XT (with basic knowledge of Microsoft Excel).

Instructor’s resume
Wilant van Giessen received his Master’s degree in Plant Pathology/Entomology at Wageningen University and has made extensive use of Microsoft Excel while doing research in Charleston, South Carolina (USA). Since August 1999 Wilant heads the Southeast Regional office of Noldus Information Technology Inc., out of Asheville, North Carolina. Showing users how to apply Excel has been part of many of the more than 300 EthoVision and Observer training sessions he has organized.
TUTORIAL

Psychophysiology Applications Using a BIOPAC MP System

Date: Tuesday, August 24
Time: 11:00-12:30
Location: Curie
Instructor: Aleksandar Dimov (BIOPAC, Systems Inc., USA)

Benefits
This hands-on tutorial will demonstrate the power and flexibility of the BIOPAC MP150 data acquisition and analysis system for typical psychophysiological applications: ANS recordings; Evoked Response Studies (VER, AER & SER); Event Related Potentials (P300); Sexual Arousal Studies; Heart Rate Variability; Startle Eye Blink Tests; plus a host of other biopotential and transducer recordings.

Features
New advanced topics will be covered such as using the BIOPAC scripting language to create your own custom automated data analysis routines, how to send physiological data to other applications in real-time, and the BIOPAC fNIR optical brain imaging system for measuring neural activity and hemodynamic response in the prefrontal cortex.

Learn how to use an MP System to record a wide variety of ANS functions, including heart rate, skin conductance/resistance/temperature, muscle tension, neuronal activity, and eye movement. Display measurements (e.g., mean value and standard deviation) during or after data collection.

Perform detailed event related potential (ERP) studies using a variety of stimulus options, including virtual reality, image presentation, video clips, sound, and somatosensory stimulation. Combine physiological and psychological (self-assessment) responses. Enter equations to combine multiple physiological variables for automatic assessment, or choose from preset calculations for simplified setup. Mark events and write comments as they occur or after the fact, and easily generate presentation quality results.

An overview of the Educational tools will demonstrate how the Biopac Student Lab facilitates learning and aids in the development of analytical and critical thinking skills. Automatic calibration routines and embedded sensor technology minimize frustration. The BSL System optimizes lab time by reducing setup by up to 90% so students can focus on understanding results. We include fundamental lessons, plus we’ll show how to easily create your own protocol or allow students to perform their own research projects.

Audience
This tutorial is aimed at new and existing users and other interested in adopting BIOPAC solutions for life science data acquisition and analysis for their research and education.
Instructor's resume
Aleksandar Dimov has worked as an application specialist at BIOPAC Systems, Inc. for four years after completing an MA in Psychology at UCSB. At UCSB, Aleksandar Dimov was an instructor for the Advanced Virtual Reality Training Institute for Social Psychology, while at BIOPAC he has conducted most of the training and seminar sessions on physiological recording and data analysis techniques at universities across the US, Europe and Asia.
TUTORIAL

BIOPAC Electrodermal Activity (EDA) Analysis

Date: Thursday, August 26
Time: 10:00-10:40
Location: Zernike
Instructor: Aleksandar Dimov (BIOPAC, Systems Inc., USA)

Benefits
In this tutorial, an introduction into the physiological basis for electrodermal activity (EDA) recordings will be given. Terminology will be reviewed to explain the conventions used in the AcqKnowledge software.

Features
The tutorial will be based on examples with real experimental data. The audience will be walked through the steps in the analysis process. Two types of data analysis will be covered: comparisons for EDA activity between different conditions in an experiment and event-related EDA analysis. Sample data will include trials from running the Iowa Gambling Task as well as two other experimental setups.

1. Introduction to EDA recording and analysis.
2. Overview of existing analysis techniques.
3. Analysis based on tonic EDA.
4. Location of SCRs (skin conductance responses).
5. Event-related EDA analysis.
6. Special cases: dealing with skin conductance responses too close together; controlling stimulus delivery based on the current EDA activity via real-time signal monitoring in order to avoid stimulus delivery while a SCR response is in progress.
7. How to modify the analysis routines to customize the analysis. Using the BIOPAC Scripting Language to modify the code for the analysis, create your own dialogs and automate the process completely.
8. A discussion of additional enhancements that provide more options for multiple stimulus event types and unmatched events.

Audience
This tutorial is aimed at new and existing users and other interested in adopting BIOPAC solutions for life science data acquisition and analysis for their research and education needs.
Instructor’s resume
Aleksandar Dimov has worked as an application specialist at BIOPAC Systems, Inc. for four years after completing an MA in Psychology at UCSB. At UCSB Aleksandar Dimov was an instructor for the Advanced Virtual Reality Training Institute for Social Psychology, while at BIOPAC he has conducted most of the training and seminar sessions on physiological recording and data analysis techniques at universities across the US, Europe and Asia.
TUTORIAL

Integrating Real-Time Physiological Monitoring Using Mindware and The Observer XT

Date: Tuesday, August 24
Time: 16:00-17:30
Location: Planck
Instructors: Marty Gillman (Mindware Technologies, USA)
            Jason Rogers (Noldus Information Technology, USA)

Benefits
This tutorial will demonstrate the use of MindWare’s Bionex data acquisition platform and the real-time analysis capabilities of their software and the external data import function of The Observer XT.

Features
This integration allows for the online derivation of higher order physiologic measurements such as heart rate variability (RSA), pre-ejection period (PEP), and stroke volume (SV) historically requiring post-analysis processing. Using The Observer XT, you can easily import the statistical information allowing for analysis of physiology indexed by behavior and vice versa.

Audience
This tutorial is intended for novice or experienced users of The Observer XT’s External Data Module and researchers interested in physiological data acquisition and signal processing.

Instructors’ resume
Marty Gillman is V.P. of Engineering at MindWare Technologies in Gahanna, OH, USA. Marty has over 15 years of real-world engineering experience in automated test engineering, data acquisition, and signal processing. For the last 7 years, he has focused his efforts on developing state-of-the-art hardware and software solutions specifically for use in human and animal physiology.

Jason Rogers is an Application Specialist for Noldus Information Technology, Inc. He earned a Ph.D. in experimental psychology in 2005. Before joining Noldus Information Technology, Jason was a Post Doctoral Fellow at the Medical University of South Carolina, USA, where he used EthoVision XT to characterize behavioral deficits in rats with a history of methamphetamine use.
TUTORIAL

Eye-tracking Systems - User’s Dilemma In Choosing the Right Solution. Need-Promise-Delivery: An Overview

Date: Tuesday, August 24
Time: 14:00-15:30
Location: Zernike
Instructor: Christian Lappe (SensoMotoric Instruments GmbH (SMI), Germany)

Benefits
The tutorial would go through the various applications, the challenges and realistic expectations for various form factors in choosing the right eye-tracking system.

Features
In this tutorial, we will discuss the different vendors’ solutions and discuss the pros and cons, the pitfalls of different eye-tracking solutions.

Audience
Anyone who is currently using an eye-tracking system or intends to use one.

Instructor’s resume
Christian Lappe is Director, Head of Sales & Marketing at SMI SensoMotoric Instruments GmbH.
TUTORIAL

The Observer XT in HCI research

Date: Tuesday, August 24
Time: 11:00-12:30
Location: Zernike
Instructor: Tobias Heffelaar (Noldus Information Technology, The Netherlands)

Benefits
In this tutorial you will learn how to design, execute and analyze observational studies in the context of HCI research and usability testing. This includes how to configure and use the software tool The Observer XT in various stages of the research and development process, from field observations to summative usability tests. The tutorial will end by examining how to combine observational data collection with other techniques, such as eye tracking and physiological data acquisition.

Features
Topics covered in this tutorial:

- Designing the coding scheme
  - From basic to elaborate, from generic to specific, best practices
  - Freeform annotation vs. structured event logging
  - Translating a research question into a coding scheme
  - Optimizing the coding scheme to make scoring easier
- Data collection
  - Real-time logging
  - Post-test annotation
- Multimodal measurements
  - Eye tracking, physiological data acquisition, keystroke and mouse logging
  - Combining The Observer with other data collection tools: synchronization of measurements, data import
  - Integrated visualization of video streams, events and signals
- Analyzing observational data
  - Qualitative analysis: reviewing tests, creating video highlights
  - Quantitative analysis: computing performance measures and usability metrics
  - Design a simple and effective coding scheme for both qualitative and quantitative data collection.

Audience
This course is intended for human-computer interaction researchers and usability practitioners (usability engineers, UI designers, usability testers) who wish to take
advantage of The Observer XT to enhance the quality of their measurements and the efficiency of their projects. The course is useful for people working in academic research, corporate human factors groups as well as independent consulting firms.

Both novices and experts can benefit from this course. For instance, the novice will learn the basic of event logging while the expert will learn how to integrate video with observational and psycho-physiological measures.

**Instructor’s resume**

Tobias Heffelaar received a M.Sc. in social science information technology from the University of Groningen (The Netherlands). Since 1998 he has been working for Noldus Information Technology as a usability engineer, trainer, and consultant. He has extensive experience in setting up software and hardware tools for Human-Computer Interaction research and usability testing, and training users.

Observation made simple!

- Collect rich and meaningful behavioral data
- Integrate video and eye tracking data
- Record emotions and user-system interactions automatically
- Discover our high-tech, fully installed usability labs
- Join a worldwide community of users

The Observer™ XT – the professional and user-friendly software for the collection, analysis, and presentation of observational data. Multiple data streams can be combined, from user actions and eye movements to physiological and simulator data.

FaceReader™ – the unique software for automatic analysis of facial expressions: sad, happy, disgusted, scared, angry, and surprised.

Complete solutions – from handheld observation systems and portable labs to customized stationary labs to make synchronous recordings of video and behavior. Make synchronous multimodal recordings of screen captures, audio, mouse clicks, key presses, and more.

Services – all our solutions come with training and technical support, and you can always contact us consulting services and rental opportunities.

Innovative solutions for human behavior research

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User Meetings
User Meetings

User meetings are sessions organized by the exhibiting companies, usually manufacturers of research software and/or instruments. These meetings provided forums in which users:

- Exchange information and experience with fellow users
- Learn about the latest product developments
- View prototypes of new products
- Discuss product development, release schedules, installation and support procedures, etc.

Schedule
The following user meetings are scheduled:

- Theme (page 121)
- EthoVision (page 123)
- The Observer (page 124)
- CatWalk (page 125)
USER MEETING

Theme

Date: Tuesday, August 24
Time: 11:00-12:30
Location: Planck

Organizers: Gudberg K. Jonsson (Human Behavior Laboratory, University of Iceland, Reykjavik, Iceland).
An overview of recent research involving the t-pattern model and Theme.
Magnus S. Magnusson (Human Behavior Laboratory, University of Iceland, Reykjavik, Iceland).
Scientific advances: new concepts, features and applications.

Aim of the meeting
In this session, users of Theme will get together to learn about the latest scientific advances, exchange experiences with other users, and discuss future development, desired product features, etc.

Program

Case studies presented by users of Theme, coming from different research disciplines. Subjects can be the type of research or tests users are doing with Theme, problems encountered, and solutions that have been found:

  Tarik Hadzibeganovic (Cognitive Science Section, Department of Psychology, University of Graz, Austria)

- Temporal structure of rodent’s anxiety-related behavior in the hole-board experimental assay.
  Maurizio Casarrubea (Department of Experimental Biomedicine and Clinical Neurosciences, Human Physiology Section, School of Medicine, University of Palermo, Italy)

- Efficacy of T-patterns in Observational Methodology: Current Applications in Sport, Physical Activity and Dance.
  M. Teresa Anguera (Department of Methodology of the Behavioral Sciences, Institute for Brain, Cognition and Behavior, Faculty of Psychology, University of Barcelona, Spain)

- Identification and description of behaviors and dominance patterns in captive vervet monkeys (Cercopithecus aethiops pygerythrus) during feeding time.
  Gerardo Ortiz (The Center for Behavioral Studies, University of Guadalajara, Mexico)
• Discussion about possible directions for new developments with Prof. Magnus S. Magnusson, director Human Behavior Laboratory, University of Iceland, founder of PatternVision Ltd. and creator of Theme.
USER MEETING
EthoVision

Date: Tuesday, August 24
Time: 11:00-12:30
Location: Lorentz-Zeeman
Organizer: Ruud A.J. Tegelenbosch (Noldus Information Technology, The Netherlands)

Aim of the meeting
In this session, users of the EthoVision video tracking system, come together to learn about the latest product developments, exchange experiences with other users, and discuss future development, desired product features, etc.

Program

• Introduction (Ruud A.J. Tegelenbosch, Noldus Information Technology, Wageningen; The Netherlands)

• Case studies presented by users of EthoVision:
  • Use of automated tracking system across anxiety and depression models in rodents (Dr. J. Adriaan Bouwknecht; Johnson and Johnson; Belgium)
  • Monitoring zebrafish larvae locomotor activity using DanioVision (Herma C. van de Linde, B.Sc.; Erasmus MC, Rotterdam; The Netherlands)

• Presentation of research:
  • Automated Recognition of Rodent Behavior at a Higher Level (Elsbeth A. van Dam, M.Sc.; Noldus Information Technology, Wageningen; The Netherlands)

• General discussion
USER MEETING
The Observer

Date: Tuesday, August 24
Time: 14:00-15:30
Location: Lorentz-Zeeman
Organizer: Niek Wilmink (Noldus Information Technology, The Netherlands)

Aim of the meeting
The aim of this meeting is to exchange experiences with other users, discuss future development and desired product features for The Observer XT.

Program

• Introduction (Niek Wilmink, Noldus Information Technology, Wageningen; The Netherlands)

• Group discussion session 1
  In several small groups ideas will be exchanged and projects made in The Observer XT will be discussed

• Presentation of results

• Group discussion session 2
  In several new small groups ideas will be exchanged and projects made in The Observer XT will be discussed

• Presentation of results

During the group discussions Noldus personnel is ready to assist.
USER MEETING

CatWalk

Date: Tuesday, August 24
Time: 16:00-17:30
Location: Lorentz-Zeeman
Organizer: Reinko Roelofs (Noldus Information Technology, The Netherlands)

Aim of the meeting

The aim of this meeting is to have an in-depth discussion of the CatWalk XT system. The main topics will be the current shortcomings, improvement points and future development needs.

Program

- Introduction (Reinko Roelofs, Product Manager; Noldus Information Technology, Wageningen; The Netherlands)
- Group discussions
- Presentation of results
- During the discussions the CatWalk development team will be present.

Audience

This meeting is for current users of CatWalk, by invitation only.
Observation made simple!

- Describe behavior in an accurate and quantitative way
- Collect rich and meaningful behavioral data
- Calculate statistics & assess reliability
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Workshops
Workshops

Workshops are interactive discussions about specific aspects of measuring techniques. Although there may be formal presentations by workshop participants, it is the intention that the workshop organisers create sufficient space to allow for thorough discussion of the workshop’s topic. Research presentations made during a workshop are not normally published in the conference proceedings.

The following workshops are held during the conference:

- Measuring (Ambient) Persuasive Technologies (page 129)
- Wildlife surveillance using GPS: From movement tracking to behavior recognition (page 131)
- Measuring consumer behavior (page 135)
- Innovation in movement behaviour analysis (page 137)
- Measuring behavior in forensic research and prevention of crime (page 139)
- A recipe for measuring behavior in autism research (page 141)
- Event Recognition for Behavior Measurement, Intelligent Resource Management, and Beyond (page 144)
- Teaching a course on Measuring Behaviour (page 147)
WORKSHOP

Measuring (Ambient) Persuasive Technologies

Date: Wednesday August 25
Time: 10:00-12:30
Location: Zernike
Chairs: Wolfgang Reitberger, Alexander Meschtscherjakov and Manfred Tscheligi (University of Salzburg, Austria), Boris de Ruyter (Philips Research Europe, The Netherlands) and Jaap Ham (Eindhoven University of Technology, The Netherlands)

Recent research has started investigating Persuasive Technology, which can be defined as technologies that are “intentionally designed to change a person’s attitude or behavior or both”. For example, persuasive picture frames can be used to improve sitting posture, dashboard instruments can give car drivers feedback about their fuel consumption, and robots that take on the role of social actors and praise or criticize users depending on their performance.

The current workshop will assess the measurement of Persuasive Technologies. That is, crucial in the effective development and employment of these technologies is the measurement of persuasive effect in general, long term effects in particular, underlying mechanisms and processes and appropriate methods to measure such effects. Measuring Persuasive Technology inherently demands a multidisciplinary approach: Amongst these are perspectives related to human-computer interaction, psychology, sociology, and ethics/morality.

Next to stimulating conscious behavior changes, (ambient) persuasive technology can also influence behavior in unconscious ways. The workshop will not only spend attention to variables related to conscious behavior change (e.g., explicit attitude change), but also to unconscious determinants and effects (e.g., implicit attitude change).

Program
There will be a series of talks, with sufficient time for discussion among the participants.

The invited researchers and their respective topics are:

- Cees Midden: Assessing the social psychological consequences in behavior and cognition of Persuasive Technology
- Virpi Roto: Measuring feelings - What can persuasion learn from user experience
- Harri Oinas-Kukkonen: Prerequisites for successful measuring of ambient persuasive technology. The abstract of this presentation is published in the conference proceedings.
• Andreas Spahn and Philip Nickel: Trust, discourse ethics, and persuasive technology
• Magnus Bång: Approaches for measuring behavior change in energy consumption interventions
• Jörg Müller: Audience measurement for digital signage
WORKSHOP

Wildlife Surveillance Using GPS: From Movement Tracking To Behavior Recognition

Date: Wednesday, August 25
Time: 10:00-13:00
Location: Ernst
Chairs: Herbert Prins (Resource Ecology Group, Wageningen University, The Netherlands), Andrea Kölzsch (Netherlands Institute of Ecology, The Netherlands), Arnold Bregt (Center for Geo-Information, Wageningen University, The Netherlands), Tamme van der Wal (AeroVision BV, The Netherlands) and Lucas Noldus (Information Technology BV, The Netherlands)

Theme
Understanding the individual and social behavior of wild animals in the context of their habitat is imperative to protect and increase biodiversity. Our ability to observe individuals in the wild has increased exponentially with the availability of GPS. The increased miniaturization and prolonged operation time of GPS receivers and loggers allows us to consider new ways of analyzing and influencing animal behavior.

Rationale
Around the globe, initiatives are undertaken to protect and - where possible - increase biodiversity. The declaration of 2010 as the International Year of Biodiversity by the United Nations illustrates that governments support the importance of biodiversity as a prerequisite for science, economy and society. For example, ‘ecological corridors’ and ‘ecoducts’ are constructed to increase freedom of movement for wildlife, to prevent splitting of populations, and to optimize the integration of nature conservation, agriculture and recreation. However, this can also lead to unwanted confrontations between humans and animals (e.g. traffic incidents), damage to crops, and the spreading of diseases between wildlife and farm animals.

Until recently, available technology (like radio tracking and satellite tracking techniques) suffered from limited temporal and spatial resolution, resulting in position data that are too coarse to determine how animals behave relative to the environment and each other. In other words: it tells you where the animal is but not what it is doing. Furthermore, the size and weight of transmitters and batteries made them unsuitable for small animals.

Workshop Objectives
GPS technology allows moving objects to be tracked at small time intervals, and spatial resolution has improved dramatically over the years. However, analysis tools able to process
large streams of GPS data and to convert spatial coordinates into behavioral parameters are still lacking. New approaches to extracting information and transforming it into knowledge have to be found. Furthermore, by adopting concepts from the field of artificial intelligence, GPS tracking can be extended with real-time data processing, interpretation and feedback, offering fascinating new opportunities for wildlife management and disease control. The objective of this workshop is to discuss the state-of-the-art, exchange practical experiences and define a first set of requirements towards a GPS-based behavior measurement and wildlife management system.

**Workshop Program**

The workshop will consist of four technical topics:

1. **Measurement**: what to measure (location, time, physiological signals, ambient variables) and how. This includes (non-exhaustive list):
   - Possibilities of GPS relative to radio tracking and satellite tracking
   - Logging versus real-time transmission of location data
   - Temporal and spatial resolution: what can be achieved?
   - GPS tracking under challenging conditions
   - Integration of movement data with ambient parameters or physiological signals

2. **Analysis**: processing of position data and other variables into behavior recognition. This includes (non-exhaustive list):
   - Algorithms for location-based event recognition
   - Algorithms for behavior recognition and movement track segmentation
   - Integration of GPS data analysis and GIS systems
   - Software tools for analysis of movement patterns, individual behavior and interactions

3. **Feedback & Intervention**: closing the loop, from real-time processing to feedback, guidance and control. This includes (non-exhaustive list):
   - Real-time data reduction, analysis
   - Feedback to the animal: guidance systems
   - Feedback to the environment: control systems

4. **Hardware aspects**: energy issues, robustness, size (miniaturization), weight, etc. This includes (non-exhaustive list):
   - Size and weight of GPS loggers
   - Battery life, duration of measurements
   - Impact of hardware on animal behavior and welfare

Each topic is important for GPS-based behavior analysis and guidance systems, but has individual characteristics and progress. Prior to the workshop a market survey is performed.
to gather information about current practices, experiences, applications, and requirements for future technology. The discussion of each topic will start with the analysis of the market survey. This is followed by a discussion on the state-of-the-art in this topic: where do we stand today, what is technically possible? Based on this the challenges based on user needs are defined: what lies ahead of us, which questions need to be answered, which technical hurdles must be taken? These are translated into the final step: product requirements for GPS based behavior measurement, analysis and feedback systems. What should a measurement, analysis of feedback system be able to do?

The workshop topics (hardware, measurement, analysis and feedback) are all discussed in 4 aspects: Results of the market survey, state-of-the-art, challenges and the product requirements.

**Workshop Scope**

Although the workshop is primarily targeted at wildlife, advances and lessons learned in animal husbandry and free-ranging cattle among others are welcomed as that application domain has similar requirements towards the behavior analysis system.

**Workshop Agenda**

The program is structured as follows:

- Welcome and introduction
- Topic 1: Measurement
- Topic 2: Analysis
- Demonstrations of hardware & software
- Topic 3: Feedback & Intervention
- Topic 4: Hardware aspects
- Wrap-up: conclusions and follow-up activities
This workshop brings together researchers, practitioners and technology providers discussing their needs for wildlife movement tracking, data processing and analysis. We will present the state-of-the-art, exchange practical experiences and discuss future challenges. Participants are invited to share their own research results and experience from field studies. Demonstrations of hardware and software are welcome too. We would like to initiate a lively discussion on the topics listed above. Attending this workshop will provide participants with a better understanding of the possibilities, limitations and future research directions of wildlife surveillance using GPS technology.
Assessment of consumer behavior in specific situations, using observational and physiological methods, is becoming increasingly important in understanding conscious and unconscious consumer behavior. An increased understanding of consumer behavior may result in the development of improved consumer products and in more healthy dietary patterns. A growing number of techniques is available to assist researchers in measuring various aspects of consumer behavior such as walking patterns, product selection, meal composition, and eating/drinking. Due to advances in digital video, sensor technology and computer speed, complex measurements of behavior and physiology are now possible. Integration of these techniques allows multimodal measurements. With the growing number of techniques, the challenge for the researcher to choose the right solution becomes larger. Questions to be answered in order to select the right combination of solutions include:

- How do I upscale techniques that have proven themselves in the laboratory to real-life test situations such as supermarkets and restaurants? In the recently constructed ‘Restaurant of the Future’ in Wageningen (The Netherlands), observation of everyday behavior is combined with psychological, physiological and sensory measurements. Other research requires observation of consumers in other situations, such as hospitals, supermarkets, and school canteens.
- Which tools do I use for observation: video, physiological measurements, tracking, facial expressions analysis, head movement, eye-tracking – or a combination of these methods?
- Measuring consumer behavior can result in an overload of acquired data. How do I select, analyze, transport, and store these data in an effective and safe way?

This workshop intends to bring together users and developers of measurement tools for consumer behavior, to discuss the state of the art, advancements, experiences, expectations and bottlenecks. As such it will provide a platform for exchanging information about the opportunities, challenges and needs in the fast developing area of consumer behavior research. It will be organized as a series of presentations, followed by group discussion.

Program

• Oliver Amft (ETH Zurich, Switzerland) The development of a system for automatic monitoring of consumer eating and drinking behavior.

• Svetlana Bialkova & Hans van Trijp. (Wageningen University, The Netherlands). Is Eye-tracking an effective experimental tool for capturing consumers attention?

• Marten den Uyl (VicarVision bv, The Netherlands): Use of FaceReader for Measuring facial expressions in real-life situations.

• Leanne Loijens (Noldus Information Technology bv, The Netherlands): Inside Consumer Experience: studying consumer behavior in the field.

**Audience**

This workshop aims to bring together researchers involved in consumer behavior research, as well as developers of technology and tools for measuring consumer behavior.
WORKSHOP

Innovation in Movement Behaviour Analysis

Date: Wednesday, August 25
Time: 14:00-17:30
Location: Ernst
Chairs: Monica Wachowicz (Wageningen UR, The Netherlands), Arend Ligtenberg (Wageningen UR, The Netherlands), Stefan van der Spek (TU Delft, The Netherlands) and Bettina Speckmann (TU Eindhoven, The Netherlands).

This is a discussion oriented workshop that will emphasise an in depth multi-disciplinary discussion on the latest research and new experimental approaches aimed at addressing the current gaps in knowledge in the field of movement behaviour analysis. Understanding of mobility patterns and their respective movement behaviours will increasingly become key factors for success in business, as the location and movement of customers, resources and products increasingly becomes a central consideration in an increasingly mobile world. It is essential in the prediction and monitoring of individual and group behaviours for managing, responding to and mitigating hazards and threats to security over short and long time scales. Equally, traffic simulation can greatly benefit from the analysis of movement data, for example through better estimates of key model parameters. This Workshop will provide a forum by bringing together key players from industry, the public sector and academia.

This workshop is a joint initiative of the projects: MODAP (Mobility, Data Mining and privacy) http://www.modap.org/, and MOVE (Knowledge Discovery from Moving Objects) http://www.cost.esf.org/domains_actions/ict/Actions/IC0903-Knowledge-Discovery-from-Moving-Objects-MOVE-End-date-October-2013

Workshop Program

- N. Shoval and B. McKercher. Investigation of tourists’ activity patterns in a World City using GPS technology: Hong Kong as a case study.
- M. Isaacson. Discovering aspects of routine in high resolution time-space data.
- Tea Break

• G. Gidofalvi. A mobile consumer analysis platform.
WORKSHOP

Measuring Behavior In Forensic Research and Prevention Of Crime

Date: Thursday, August 26
Time: 10:00-13:00
Location: Lorentz-Zeeman
Chair: Hans Arnold (The Netherlands Forensic Institute)

Measurement of human behavior has a number of applications in the prevention of crime and in the investigation of a crime scene. The purpose of the workshop is to discuss and to get more insight in the possibilities to combine methods and technologies for measuring behavior in forensic research in crime scene investigation and new security concepts to predict and to prevent crimes.

In this workshop, four applications are presented that are based on the use of different methods and techniques. These applications could benefit from each other by a mixed use of the methods and techniques presented. This question will be discussed with the audience.

Program

10.00 Chair: Hans Arnold (The Netherlands Forensic Institute)
Introduction and structure of the workshop.

10.10 Andro Vos and Jurrien Bijhold (The Netherlands Forensic Institute)
CSI the Hague
One of the goals of the CSI The Hague innovation project is to realize a facility in which a crime scene researcher can be observed in both a reconstructed crime scene and in a virtual copy of it (serious gaming). For The Netherlands Forensic Institute it is very important to carry out this exercise in cooperation with experts, institutes and companies with appropriate specialized expertise.
Measurements of behavior can help to improve feedback to trainee investigators and to study effects of particular circumstances on the behavior of the investigators.

10.40 Coffee break

11.10 Arend van der Stadt (Eagle Vision, The Netherlands): People tracking with a network of stereo cameras
Eagle Vision is a company that has developed a system based on a network of stereo cameras for registration of people’s movements over time. Noldus is a company that has developed a system for describing movements based on video recordings. A proposal for combining these systems in the context of a...
CSI experiment is presented and discussed. The stereo camera network will be shown in the demonstration showcase on Thursday afternoon.

11.40  Ron Knaap (Trigion, The Netherlands): MultiPaV-BeWare: “To predict the science of the past”

BeWare is an innovation project which will be able to analyse and combine data from alarm panels and systems, fence detectors, security cameras, public sources and police files. Software will unravel patterns and signals anomalies, for instance by making comparisons with historical data. Any anomaly will immediately trigger a warning. It is a dynamic concept that constantly adapts to changes in the environment and takes into account the reactions of security and emergency personnel. The application of this technology in training crime scene investigators is discussed.


Preventing violent or terrorist acts begins with detecting anomalous behavior in groups of people. TNO has studied and mapped out behavior of this kind. TNO also analyses camera images and radar data and uses pattern recognition to detect any anomalous behavior that they contain.

12.40  Final discussion

13.00  End of Session
WORKSHOP

A Recipe For Measuring Behavior In Autism Research

Date: Thursday, August 26
Time: 10:00-12:30
Location: Planck
Chairs: Jan Gillesen and Emilia Barakova (Eindhoven University of Technology, The Netherlands), Marc Swerts (Tilburg University, The Netherlands) and Juliane Cuperus (Sint Marie Eindhoven, The Netherlands).

Theme and objective
Autism spectrum disorders are a range of pervasive developmental disorders characterized by impairments in social interaction, communication and stereotyped patterns of behavior, interests and activities. (Mash & Wolfe, 2004) The broadness of the spectrum accords for individuals on the spectrum to have unique abilities and disabilities. This means that within user groups, the needs for therapy intervention are not equal between people, and may even be contradictory. This requires great flexibility and adaptation capabilities in intervention methods.

The aim of this workshop is to review and discuss existing approaches and search for common points on how the behavior of children with autism spectrum disorder (ASD) is measured. Specifically we are interested in measuring behaviors that relate to social interaction. These include verbal or non-verbal behavior that is expressed in social communication, perceiving and reacting to other’s signals such as: spontaneous movements, confused and non-coded movements, coded hand movements, facial expressions, and verbal expressions. We are focusing on children with ASD, as these people benefit mostly from early intervention and early education programs, to maximize the effort of skill development. (Hume, Bellini, & Pratt, 2009; Rogers, 1996)

From the perspective of the therapists, using computer based technologies gives more opportunities to understand the complexity of (social) behaviors of the autistic children. They can make it easier to study specific (elements of) behaviors. We envision usage of different technological tools for observation and recording of behavioral variables such as video recorders, integrated systems as for instance the Noldus system, virtual reality systems and robots.

The broadness of the spectrum is also dependent on other dimensions. Children may have other needs and wishes than adults. Individuals may be low or high functioning, having linguistic together with social impairments, or combined with sensory impairments. When measuring behavior, we can look at the productive or receptive qualities of the individuals. Interventions themselves may be aimed at skill development or diagnosis of ASD.
The outcome of the workshop is to discuss several interesting projects that encompass a user study where the behavior of children with ASD is measured in one of these ways. What are the necessities and requirements to make such a user study successful? The objective of the workshop is to create a protocol or list of requirements through discussion of different example studies, distilling the ingredients for a successful user study with children with ASD. The recipe that comes out can be a useful handle for future studies that will help set up successful testing plans for children with ASD.

Industrial Design from Eindhoven University of Technology brings expertise in employing robotics systems for children with autism to promote social interaction between peers (Barakova, Gillesen, & Feijs, 2009), or to study their behavior by motion analysis. (Barakova & Chonnaramutt, 2009) Sint Marie from Eindhoven brings clinical expertise on children with autism. The Humanities faculty of Tilburg University will bring expertise from the field of communication and cognition, in particular the functional analysis of nonverbal features in adults and children. (http://foap.uvt.nl)

**Preparation**

Participants are asked to bring inspiring materials from the abovementioned area to openly discuss and distill the interesting ingredients from. This includes papers of relevant studies, but may well be movie materials, presentations or anecdotes and so on.

In the selected materials, consider specifying dimensions like age (children or adults), abilities (low or high functioning), if the measured intervention is diagnosis or treatment based and if productive or receptive actions are measured.

To quickly process all the materials involved, we ask contributors to present their materials within maximally 6 minutes.

**Workshop**

10:00  Introduction round

10:10  Presentation of materials
  Participants are encouraged to write down points they find interesting or inspiring on prepared cards during presentations.

10:40  *Coffee Break*

11:10  Discussion.
  Discuss the possible ingredients that we saw (through open forum discussion). Through this discussion, more ingredients may appear.

11:40  Making the recipe.
  Organizing and ordering the ingredients (through open forum discussion).

12:10  Summary and wrap-up
  Process and results are briefly summarized. People are given opportunity to
express their opinion on the workshop and their interest in following up on the workshop (i.e. contributing to a possible paper).

12:30  Lunch Break

Workshop follow-up
If our aimed goal is reached then the results will be published in a (short) paper.

Targeted audience
We are looking for people who are related to autism research from different backgrounds, which can be technological, clinical, psychological, or anything else.

References

WORKSHOP

Event Recognition for Behavior Measurement, Intelligent Resource Management, and Beyond

Date: Friday, August 27
Time: 10:00-12:30
Location: Ernst
Chairs: Jobst Löffler (Fraunhofer Institute for Intelligent Analysis and Information Systems IAIS, Germany).
       Ben Loke (Noldus Information Technology bv, The Netherlands).
       Jens Pottebaum (University of Paderborn, Germany)

Complex event processing, real-time data analysis, and event-driven software systems are highly relevant topics for various research communities as well as for enterprises dealing with enormous amounts of business data. New approaches to extracting information, transforming it into knowledge, and acting on it have to be found. With this workshop we would like to offer an opportunity for researchers, practitioners and technology providers to discuss techniques for detecting, tracking, and processing events that can be applied in behavior measurement. Further on the utilization of behavior measurement results, e.g. intelligent resource management and corresponding feedback to measurement processes will be discussed. During the workshop the underlying concepts of event-driven information management will be introduced.

As a practical example and starting point for discussion, methods, tools, and applications which have been developed within the EC funded FP7 project PRONTO (www.ict-pronto.org) will be demonstrated. PRONTO emphasizes the role of event recognition in intelligent resource management. The project proposes a methodology for analyzing data from various sources to extract useful information in the form of events and fusing it to actionable information. The PRONTO approach will be evaluated in two case studies in the domains of emergency rescue operations and city transport management.

Topics
Topics of interest include, but are not limited to:

• Algorithms for real-time event recognition
• Multi-modal/fusion techniques for sensor data and event streams
• Benchmarks, performance evaluations, and test beds for the application of event recognition to behavior measurement
• Indicators for the detection of events in complex real world systems
• User interaction and interfaces for event navigation, browsing, and management
Utilization of behavior measurement in decision making processes and lessons learned

Domain-specific deployments of event-based systems

During the workshop presentations will be given that summarize current research in the field of Event Recognition for Behavior Measurement, Intelligent Resource Management, and beyond. They open the discussion on bringing together different approaches from different domains to strengthen research efforts. In detail the contributions will focus on the following activities:

Alex Lechleuthner and Ompe-Aimé Mudimu (The Institute of Rescue Engineering and Emergency Management of Cologne University of Applied Sciences, Germany) are involved with the laboratory (Benedikt Weber, Frederik Schütte and Benjamin Käser) for major incidents in the area of training observation and infield-research. The Standard-Exercise-System (SES) allows scientific research and evaluation with infield tests. With this system, data is aggregated using processes that enable a fundamental examination of safety and security systems. The first step is a parameter definition to identify the measurement points. Furthermore, specific parameters and process components are changed or replaced in order to measure improvements and to formulate user specifications. The measurements are based on a Tele Voting system. This system was adapted and expanded for use in the area of safety and security. Essentially, data is collected in three different modes: live mode, presentation mode and offline mode. In the future, this system is supplemented by a local positioning system.

Gertjan Burghouts, Maaike Lousberg and Judith Dijk (TNO Defense, Security & Safety, Den Haag, The Netherlands) focuses on human behaviour that precedes unwanted situations. Examples of these unwanted situations are everyday crime, escalating events and demonstrations, aggression in the cities, public transport, acts of violence, the destruction of windows, cables, and the entering of critical infrastructures and private properties. To ensure public safety and security, an adequate awareness of the situation plays a critical role for the professional. Video, audio and sensor based surveillance is a critical asset to achieve such awareness. TNO analyzes the situation and the behaviour of the people in the scene. First, deviant behaviors are identified using knowledge of psychology. Then, sensor and contextual data is collected from the available sources and analyzed in two sequential steps. In the first step, the software detects behavioral characteristics that may hint at unwanted situations. In the second step, the software interprets the detected behaviors, to assess whether unwanted situations are probable.

Jeroen van Rest (TNO, Security & Safety, Den Haag, The Netherlands) and his team argue that designing systems for human behaviour observation is difficult. Subjects might not cooperate, or might even be hostile towards the system. The observation system itself might influence the observation. The personal data that is gathered falls under privacy laws
and regulations which complicate the design. Yet human behaviour observation systems (HBOS) are being applied in many domains, such as security, mobility, care, entertainment and science. Due to technological advancements, mainly driven by Moore’s Law and the human drive to codify knowledge into systems, the technological building blocks of HBOS show exponential increasing capabilities. In all developed countries the legislative branch is responding by updating privacy laws, but social new media tempts individuals to register personal data out of free will. In this complex and dynamic setting, the designers of HBOS have their challenges cut out for them. The team argues that design patterns exist for HBOS. Unlike best practices, these patterns are independent of culture, application domain or technological development. A design pattern is primarily identified by a unique name, and described by a challenge and a solution for that challenge. It can be explained by showing the recurring pattern in different example implementations. Design patterns are well known in software engineering, but they can be generalized to other aspects, such as the physical or temporal dimensions of a system.

The workshop can be of interest for computer scientists, mathematicians, AI experts, as well as behavioral biologists and psychologists. We would like to initiate a lively discussion on the topics listed above and no specific background knowledge is required for participation. Attending this workshop will provide the participants with a more refined view on the advantages and disadvantages, with respect to applicability as well as output, of event-driven approaches.
Teaching a Course on Measuring Behaviour

Date: Friday, August 27
Time: 10:00-12:30
Location: Planck
Chair: Richard E. Brown and Timothy O’Leary (Psychology Department, Dalhousie University, Halifax, Nova Scotia, Canada)

The purpose of this workshop is to discuss the teaching of undergraduate and graduate courses in “Measuring Behaviour”. The authors will discuss their experiences and share their course outline and then discuss
1. possible topics to be covered in such a course,
2. textbooks and readings,
3. laboratory (practical) projects,
4. equipment needed, (ethics for testing animal and human subjects),
5. grading
6. student evaluations.

We have developed such a course, which has one lecture and one laboratory class per week for 13 weeks. The lecture portion of the course was designed to discuss the issues involved in understanding the importance of measuring behaviour, from fruitfly courtship behaviour to human facial expression and social behaviour. The laboratory component was designed to give practical experience in conducting behavioural research. We used the textbook “Measuring Behaviour”, 3rd edition, by Paul Martin and Patrick Bateson, plus a number of journal articles and course notes that we prepared ourselves.

The laboratories enabled students to use the techniques discussed in class in four different projects:
1. Qualitative and quantitative description of mouse home cage behaviour;
2. Qualitative and quantitative description of mouse behaviour in the open-field and elevated plus maze: as measured by students and automated apparatus;
3. Sequential analysis of grooming behaviour in stressed and non-stressed mice, and
4. Observing the behaviour of pedestrians at cross-walks (Independent project).

For the laboratory projects, we used a video camera, video playback system, computerized behavioural scoring program, and a computerized tracking system. Other laboratory projects that we are developing include measuring Siamese fighting fish display behaviour and gait analysis in humans.
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Scientific Tours

Besides the wide variety of poster and presentations, the conference program also offers you the unique opportunity to visit two of the premier behavioral research facilities in and around Eindhoven. There is no extra charge for participation in these scientific tours. However, there is a maximum of one scientific tour for each participant and the number of tickets is limited. Tickets are available from reception on a first-come, first-served basis.

Human-Technology Interaction (Department of Innovation Sciences, Eindhoven University of Technology, The Netherlands)

With the rapid development of modern technology and the many options it has to offer, it becomes more and more important to design technical products, systems, and environments in such a way that they are useful, useable, enjoyable, and accessible to their potential users. It is essential that, besides development of technology itself, knowledge is gained about the way users interact with modern technology. The field of user-system interaction is becoming recognized worldwide as an important research area, also at the TU/e. This interdisciplinary field, in which several TU/e departments are involved in one way or another, is the specific research domain of the subdepartment of Human-Technology Interaction.

The research group of Human-Technology Interaction HTI) conducts fundamental research to gain knowledge about user-system interaction. It studies questions related to visual perception (e.g., 3D perception), auditory perception (e.g., acoustic scene analysis), decision making (e.g., choices under information overload), persuasive technology (e.g., energy consumption feedback systems), human-robot interaction (e.g., robots for the elderly), gaming (e.g., physiological response in game play). HTI has extensive research facilities.

The tour of HTI labs will include:

- 3D lab
- Use lab: setup of the iCat as persuasive technology
- Psychological lab (cubicles): demo of Nao robot as assistive robot
- Game lab.

For more information, see HTI’s web site: http://w3.ieis.tue.nl/en/groups/hti/
Philips HomeLab

Homelab is a permanent fully functional home laboratory built to study how people interact with prototypes of intelligent technology in a real-world environment. Through HomeLab, Philips researchers can better understand their needs and motivations to use technology, and bring better products to market in the quickest possible timeframe.

Homelab is also a laboratory where everything that happens can be observed, recorded and learned from. People moving around the HomeLab are watched by an observation leader and a team of behavioral psychologists. As HomeLab inhabitants use the technology, researchers can see what they find comfortable and easy, or difficult and confusing.

The researchers use state-of-the-art technology, with a fully digital video observation and recording system. When someone in the HomeLab uses a certain feature, the control-room system records it automatically onto MPEG video. And because it’s digital, every time that feature is used, it can be recalled at the touch of a button.

The HomeLab is built as a two-storey house with a living, a kitchen, two bedrooms, a bathroom and a study. At a first glance, the home does not show anything special, but a closer look reveals the black domes at the ceilings that are hiding cameras and microphones. The observation room adjacent to the Home has direct view into the Home. Signals captured by the cameras can be monitored on any of the four observation stations. Each observation station is equipped with two monitors and one desktop computer to control the cameras and to mark observed events. The marked events are time-stamped and appended to the video data.

When setting up an experiment in HomeLab, the researcher designs a coding scheme for the observation session, listing all prototypical behaviors that are expected to occur during the session. A sophisticated analysis is conducted to find patterns in the data set. For this analysis we use the software package Theme. An example of the use of Theme is an experimental study on the usability of an universal remote control.

For more information, see http://www.noldus.com/default/philips-homelab
Exhibition

Several companies operating in a broad range of behavioral-related disciplines will exhibit their products at Measuring Behavior 2010. Get up-to-date information about what is on today’s market for behavioral research! Check out their products: visit the booths and take a look at the product leaflets in the conference bag.

NewBehavior
NewBehavior produces and markets state-of-the-art technology for automated measuring and shaping of animal behavior, including miniaturized neurophysiological data loggers for cable- and transmitter-free assessment of EEG activity in freely moving animals.

Our unique products are IntelliCage for automated assessment of home-cage learning activity and NeuroLogger for recording brain activity in a variety of laboratory species and even on freely flying birds. We do not only provide technology but also profound know-how in behavioral experimental design and automated data analysis.

UGO BASILE
UGO BASILE is one of the world leading manufacturers of instruments for physiological & pharmacological research, whose design and production team is in close contact with the latest developments in biological research and can draw on a wide variety of expertise.

Med Associates Inc.
Med Associates Inc. is the leading manufacturer, software developer, and supplier of products for behavioral psychology, pharmacology, neuroscience, and related research and teaching areas.

Our product lines include operant conditioning chambers and accessories for rats, mice, pigeons, and non-human primates, Med-PC® software for behavioral experimentation control, sound attenuation cubicles, video tracking systems, Rota Rod treadmills, open field activity arenas, conditioned place preference apparatus, and many other software and hardware solutions. Some of our new products include Video Freeze for conditioned immobility and fear conditioning, Morris Water Maze, and wireless running wheels for circadian rhythm analysis.

Studiocode
Studiocode is a global solution that has revolutionised the way people look at video analysis and distribution.
Easy to use, Studiocode captures, codes, analyzes your digital video. This system is also a video library management tool, with searching tools, transcription, and more. Very flexible, Studiocode can easily answer your requirements and adapt to very different types of video analysis.

**Mind Media**
Mind Media is regarding technology the worldwide leading company for wireless physiological monitoring and biofeedback systems, which are used worldwide for research (neurophysiology, psychophysiology and neuropsychology), clinical and training applications.

Our NeXus systems are certified to medical class IIa, CE and used by professionals in universities, clinics, hospitals and research centers for a wide range of applications where high precision physiological signals and flexible sensor configurations are required.

As well as our hardware and software we pride ourselves on our top quality support and service; demonstrations, installations, trainings, workshops and seminars. We’re happy to provide you with detailed and tailored information.

**MBRose**
We focus on feed intake and activity monitoring in home cage environment solutions and provide complete solutions, hygienic and easy to use with integrated software, providing online data acquisition and recording in database, seamlessly connecting the laboratory with the researchers desk.

**Photron**
For over 25 years Photron has been a manufacturer and designer of digital high-speed imaging cameras for scientific research and industrial applications. Products that offer unparalleled frame rate, resolution, light sensitivity and dynamic range are widely utilised to study applications including the natural world and bio-mechanics. The Fastcam SA3 offers 1024 x 1024 pixels @ 2,000fps and is ideally suited to operation in the field with HiG construction, DC power and optional remote keypad operation. The Fastcam SA5 is our highest specification product and offers mega-pixel resolution at 7,500fps and a maximum frame rate of 1 million images per second.

**Nesplora**
Nesplora is a technology company formed by a multidisciplinary team of highly-qualified neuroscientists and technicians. We design and develop innovative
solutions for behavioural study and modification. Our products help researchers and clinicians to measuring human behaviour and use the objective recorded data for assessment, treatment or prevention in neuroscience.

Our clients include universities, health systems, clinics, research centres and end-customers.

**BIOPAC**

BIOPAC develops, manufactures, and supports data acquisition and analysis systems for life science research and education, including wireless Ethernet and USB analog to digital converters, high-speed acquisition solutions, amplifiers, telemetry, logging, transducers, electrodes and accessories. AcqKnowledge software includes scoring and automation routines. BIOPAC is used in thousands of labs worldwide.

**Metris**

Metris is a trendsetter in the field of Animal Behavior, Ultrasonic Vocalisations and Sleep Research. Our products are used by scientists and researchers in over 23 countries around the world.

- LABORAS is a powerful system that fully automates behavior scoring of small laboratory animals. It tracks position and detects more than 15 behaviors. Doesn’t use video or infra-red beams!
- SONOTRACK is the best full spectrum ultrasound recording, analysis and playback system on the market. Fully automatic ultrasound vocalization (call) counting and analysis from 15 kHz to 125 kHz!
- SLEEPSIGN is advanced software widely used in sleep analysis, neurology and pharmaceutical research!

**Noldus Information Technology**

Noldus Information Technology is a leading developer of software and integrated solutions for animal and human behavior research. With over 5000 satisfied customers worldwide, Noldus creates products for application areas such as neuroscience, psychology, ergonomics, zoology, Human Factors, and entomology. Their solutions are designed to enhance the quality and quantity of data and to make optimal use of human and animal resources.

Noldus keeps a close eye on developments in the scientific community and contributes to these developments by participating in many international research projects each year. All so that they can create products that meet tomorrow’s research needs today.
Tobii Technology
Tobii is a Swedish eye tracking manufacturer. We are a leading company in offering powerful and unobtrusive instruments to understand human behaviour. Our products are widely used in scientific research, where we offer ‘real’ remote systems for (developmental) psychology, cognitive research, user-centred design, HCI, linguistics etc..

We are a partner of PST and we offer an official E-prime-Tobii integration, together with training and documentation. Interested in our new Tobii Glasses for your research? Visit our booth!

Data Sciences International
DSI offers a wide variety of physiological monitoring solutions for CNS, Cardiovascular and Respiratory Applications involving acute or chronic studies. Products include implantable and external telemetry transmitters and hardwired amplifiers coupled with data collection and analysis systems; automated and manual scoring for sleep stages and quantification of seizure events via DSI NeuroScore software: synchronized video and behavioral data. DSI sells and supports the iPRECIO implantable and programmable pump for unstressed drug dosing along with stress free monitoring. DSI has Sales Offices in Europe, USA, and Asia to provide local support and product expertise.

SensoMotoric Instruments
A leading manufacturer for eye tracking and pupillometry solutions in scientific research, industry and medicine:

- Ultra high speed / high precision systems for oculometry, neurophysiology, neuropsychology, medical diagnostics etc.
- Contact-free high-speed remote systems in developmental psychology, cognitive research, linguistics etc.
- Fully integrated and contact free systems for usability, market research, visual perception etc.
- Mobile systems for human centered studies in visual attention, interaction design, world perception in life and virtual scenes, man-machine interaction etc.
- Special solutions for cognitive and visual perception research in brain imaging environment e.g. MRI, MEG
- Open communication solutions with interfaces to observational software, EEG/ERP etc..
Smart Eye

Smart Eye is a Swedish company that develops, manufactures and markets the most innovative solutions in Eye Tracking including Smart Eye Pro and Antisleep solutions.
Social Events

Welcome Reception
The welcome reception will take place in Eindhoven. During the welcome reception you can register for the conference, enjoy a drink, and meet international colleagues and friends.

Date: Tuesday, 24 August
Time: 17:30 - 18:30 h
Venue: The Lounge (The Strip)
Fee: No extra charge

Historical Open Air Museum Eindhoven (HOME)
Surrounded by nature and yet very close to the city center, the ‘Historical Openluchtmuseum Eindhoven’ (HOME) is located near the beautiful river Tongelreep. Here you get a taste of the way our ancestors used to live and work. The museum includes a prehistoric village called Eversham, set in the Iron Age (750-50 BC) and a medieval town (500 - 1600 AD) called Endehoven.

Experience the past and be welcomed in the medieval inn “Den Bonten Os” where you can enjoy a barbecue and entertainment in historical style. Or take a walk through the village and enjoy demonstrations and workshops by various ‘medieval’ craftsmen, such as a blacksmith, tanner, tinsmith, and weaver.

Drinks are included. Transport to and from the museum will be arranged.

Date: Wednesday, 25 August
Time: 18:00 - 22:00 h
Venue: Historical Openluchtmuseum Eindhoven
Fee: €50

Walking Dinner
What better way to get a good view of Eindhoven than to join this Walking Dinner?

Get to know Eindhoven in three courses while enjoying a sightseeing tour. Walk from restaurant to restaurant, from appetizer to main course, and from main course to dessert; three courses at three different places! A tourist guide will accompany
you through the modern city center and tell you about the architectural hotspots and art history.

All courses can be chosen beforehand. Drinks are included. Transport to the city centre will be arranged.

Date: Thursday, 26 August  
Time: 18:00 - 22:00 h  
Venue: City center of Eindhoven  
Fee: From € 57,50 

Farewell Drinks
Time to say goodbye. Evaluate the conference and exchange final contact information with your colleagues during a farewell drink.

Date: Friday, 27 August  
Time: 17:30 h  
Venue: Conference Center  
Fee: No extra charge
Conference Venue

*Measuring Behavior 2010* will be held in Eindhoven, situated in the southern part of The Netherlands. Eindhoven is well known for its academic and industrial research and product development.

**Venue**
The conference takes place on the High Tech Campus Eindhoven, an ecosystem of high-tech R&D companies and a hotspot for open innovation, in the vicinity of Eindhoven University of Technology.

High Tech Campus Eindhoven is a worldwide well-known technology centre, with a diversity of high tech companies who work together in the development of new technologies. It provides advanced facilities and an optimized working culture for many thousands of top-notch engineers. It focuses on crucial technological areas such as microsystems, devices, embedded systems, signal processing an nanotechnology. It is a place where employees and businesses inspire, motivate and influence one another.

At the center of the campus lies The Strip - a long, narrow building some 400 meters in length.

The Strip is a unique facility at the heart of het campus. People come here to share ideas and experiences. This is where the campus occupants can meet up in one of the many restaurants or consult with each other in the high-tech conference rooms, restaurants and other convenient facilities such as shops, exhibitions space, private lunch rooms and a Campus Wellness Center. This striking building is equipped with all conceivable high-tech facilities.

**Address**
High Tech Campus Eindhoven
The Strip
High Tech Campus 1
5656 AE Eindhoven
Phone: +31(0) 40 2741641  
Fax: +31(0) 40 2743905
More information on the conference venue can be found on the site of Eindhoven High Tech Campus: www.hightechcampus.nl/thestrip.

The City of Eindhoven

Eindhoven is a modern city with a strong high-tech tradition and a drive for innovation. There are excellent cultural, commercial and living facilities in the city itself, and in the surrounding towns and villages.

The city has its own international airport and Amsterdam-Schiphol international airport is within easy reach. There is a good train connection between Schiphol and Eindhoven and a regular bus service from the train station to the conference center. As the largest city in the south of The Netherlands, with approximately 210,000 inhabitants, Eindhoven is the fifth city of The Netherlands. However the economy of the Eindhoven region is the second largest in The Netherlands.

Character of the City

The Eindhoven region is widely regarded as one of the high tech hotspots in Europe. Eindhoven received its city rights in 1232. At the end of the nineteenth century, Philips established its lamps factory, because of that Eindhoven is also called the ‘City of Light’.

Is much as forty percent of Dutch investments in Research and Development, are spent in this region. The Technical University of Eindhoven ranks among the best worldwide. Eindhoven is a green city, with outstretched parks and far more trees than larger cities in The Netherlands.

Together with the Port of Rotterdam and Schiphol Airport, the Eindhoven region is one of the three mainports in The Netherlands. The city is more than justified in calling itself ‘Brainport’.

Eindhoven is a city of sports: besides PSV’s football team, at the Philips Stadium, the area also excels in swimming, horse riding, hockey fields, ice rinks, an indoor ski and snowboard centre.
Location of the Conference Centre “The Strip” on the High Tech Campus Eindhoven
Location of different rooms and areas
Ground floor: Einstein, Lorentz-Zeeman and Zernike.

First floor: Einstein, Planck, Bohr, Raman, Ernst and Curie.
Practical information

Language
The official language at the conference is English. The local language is Dutch, but most inhabitants of Eindhoven speak English.

Identification
In The Netherlands, you are obliged by law to carry photographic identification (e.g. a passport).

Parking
You can park your car in car park P zero. There is no charge for that car park.

Liability and insurance
The conference fees do not include provisions for the insurance of participants against personal injuries, sickness, theft or property damage incurred during the conference. It is recommended that delegates make prior arrangements for health, accident and other insurance they deem necessary. Neither the Conference Organization nor its sponsors are responsible for any loss, injury or damage - however caused - to persons or belongings.

Credit cards
All major hotels and most restaurants accept credit cards. The conference registration desk accepts Mastercard and Visa.

Currency exchange and ATM machines
Currency can be exchanged at banks, post offices, and airports. Opening hours are generally from 9:00 to 17:00 on working days. There are ATM machines throughout the city of Eindhoven. There are also two ATM machines at the conference venue, near the Grand Café (The Strip).

Internet facilities
Free wireless internet is available. You can connect to the network with the following settings:

- Network name (SSID) = WLAN-PUB
- Network authentication = Open (or None)
- Date encryption = None (or Disabled)

Electricity
Electricity is supplied at 230V (50 Hz) everywhere in The Netherlands. Adapters may be required for your personal equipment.

Lunch
A light lunch is included in the conference fee and will be served daily between 12:30 and 14:00 in the Central Hall of the Conference Centre.
Coffee and Tea breaks

Coffee and tea, and other refreshments are free of charge during coffee and tea breaks:

Tuesday 10:30-11:00 and 15:30-16:00
Wednesday 10:40-11:10 and 15:40-16:10
Thursday 10:40-11:10 and 15:30-16:00
Friday 10:40-11:10 and 15:40-16:15

Transport and Tourist information

Your conference bag contains a map of Eindhoven. The easiest way to get to the city centre is by bus: There is a direct bus connection line 407 between the High Tech Campus Eindhoven and the Eindhoven central railway station. Busses run every 15 minutes during the rush hour and every half hour during the rest of the day. Tickets for the bus can be bought from the bus driver, but a cheaper option is to buy a ticket for multiple journeys (“stripenkaart”), which is available at many local shops and at the kiosks at railway stations. You can also travel with a public transport chip card (“ov-chipkaart”). This pass works in the entire country (“stripenkaarten” cannot be used in Rotterdam, Amsterdam or on the trains). You can buy a disposable OV-chipkaart (valid for a limited amount of time or number of journeys) at railway station ticket offices and on busses.

- For more information about the OV Chip card see http://www.ov-chipkaart.nl/ (select the language at the top of the page)
- For a database of all public transport connections see http://journeyplanner.9292.nl/
- General tourist information: http://www.holland.com/global/
- Information about Eindhoven: http://www.eindhoven.eu/
Information for presenters

Language
The official language of the conference is English.

Oral presentations
Oral presentations are grouped in Full paper sessions, Symposia, Workshops. The durations of the talks is 20 minutes, including discussion. It is advised that authors reserve approximately 5 minutes for discussion and questions from the audience. Talks in all parallel sessions start and finish at the same time. Session chairs will ensure strict timekeeping to enable you to move between sessions.

The conference organization will provide each presentation room with a laptop and a beamer. Presenters should bring their presentation on a CD or USB stick. Please prepare your presentation by trying it out on the computer during the last break time before your presentation. Your session chair will be present in the room during that break, please introduce yourself to him or her.

Poster presentations

Location
The posters will be displayed in the rooms Bohr and Raman (first floor). The number of your poster is the number that was used in the reviewing process. To find the number of your poster, see pages 61 - 67 or check at the registration desk.

Mounting
Posters can be mounted on Tuesday, Wednesday, and Thursday morning. All posters should be in portrait format. The poster boards are 122 cm x 96 cm. You can attach your poster to the poster board with thumbtacks or clean removable tape. Thumbtacks are available at the Registration Desk.

Presentation and poster viewing
In principle, posters stay on display throughout the conference, so poster viewing is possible until Friday, August 27.

Presentation of the posters is divided into two sessions:

• **Poster Session A**, Poster nrs. 1-32, Thursday, August 26, 14:00-15:40 h, Bohr
• **Poster group B**, Poster nrs. 33-63, Thursday, August 26, 16:00-17:00 h, Raman

During the session in which the poster is presented, the presenter is requested to remain at his poster as much as possible.

Handouts
Although not required, you can make one-page handouts with the essence of the poster for those who are interested. It is often difficult to visit every poster, and providing a handout can maximize the audience for a poster and facilitate information exchange about it.
Poster and Demonstration Showcase awards

The best poster and the best demonstration at the Measuring Behavior 2010 conference will both receive awards. And this is where we need your help! Please complete the voting form below. When you vote, bear in mind both the content and the presentation.

How to vote
Posters are displayed during the entire conference. The poster and demonstration sessions are both on Thursday afternoon. Please do not vote for your own presentation.

Hand in this form before 10.00 on Friday at the Registratrion Desk. Each vote will be rewarded with a small present! The winners of the Measuring Behavior 2010 Poster and Demonstration Awards will be announced at the closing session on Friday.

Voting form for the best poster and demonstration

Your name: ........................................................................................................................................................

Poster number and title: ....................................................................................................................................

Comments (why you voted for this poster):

Demonstration name: ....................................................................................................................................

Comments (why you voted for this demonstration):
Conference organization

Scientific Program Committee

- Andrew Spink, Noldus Information Technology bv, Wageningen, The Netherlands.
- Egon van den Broek, Professor in Man-Machine Interaction, Technical University of Vienna, Vienna, Austria.
- Stephen Campbell, Faculty of Education, Simon Fraser University, Burnaby, Canada.
- Nicky Clayton, Department of Experimental Psychology, University of Cambridge, Cambridge, UK.
- Wim Crusio, Research Director, French National Research Council, Talence, France.
- Robert Gerlai, Department of Psychology, University of Toronto, Mississauga, Ontario, Canada.
- Eco de Geus, Department of Biological Psychology, Vrije Universiteit Amsterdam, Amsterdam, The Netherlands.
- Ilan Golani, Department of Zoology, Tel Aviv University, Tel Aviv, Israel.
- John Krantz, Department of Psychology, Hanover College, Hanover, IN, USA.
- Fabio Paternò, Laboratory on Human Interfaces in Information Systems, Institute of Information Science and Technologies, C.N.R., Pisa, Italy.
- Vicenç Quera, Department of Behavioral Science Methods, University of Barcelona, Barcelona, Spain.
Ahmed Seffah, Department of Computer Science, Concordia University, Montreal, Canada.

Berry Spruijt, Behavioral Biology Group, Department of Biology, Utrecht University, Utrecht, The Netherlands.

Oliver Stiedl, Behavioral and Cognitive Neuroscience Group CNCR, Institute of Neurosciences FALW, Vrije Universiteit Amsterdam, Amsterdam, The Netherlands.

Manfred Tscheligi, ICT&S Center, University of Salzburg, Salzburg, Austria.

Louise Vet, Netherlands Institute of Ecology (NIOO-KNAW), Nieuwersluis, and Laboratory of Entomology, Wageningen University, Wageningen, The Netherlands.

Local Organizing Committee

- Natasja Bogers, Chair, Local Organizing Committee
- Andrew Spink, Co-chair, Program Committee
- Melvin de Bruijn, Finances
- Sabine van der Meijde, Conference secretariat

Conference Secretariat

- Sabine van der Meijde
- Yvonne Leander
- Nathalie Oostendorp