



Berzelius symposium 97

Den uppkopplade barnhjärnan

Child brain development, learning and digitalization

27 November 2017 in Stockholm • Sweden



Svenska
Läkaresällskapet

ACTA PÆDIATRICA
NURTURING THE CHILD



Svenska Barnläkarföreningen
The Swedish Paediatric Society



The symposium is arranged by the Swedish Society of Medicine in cooperation with Acta Paediatrica, Karolinska Institutets Kulturråd, Svenska Skolläkarföreningen and the Swedish Paediatric Society

Child brain development, learning and digitalization - Den uppkopplade barnhjärnan

Children and adolescents spend increasing time in front of screens; they communicate with text-messages, Facebook, Instagram, Snapchat and spend long time playing computer-games. At the same time we get reports about increasing problems with concentration, chronic stress, sleep deprivation, changing moods, problems with vision (myopia), motor function and obesity. Furthermore we hear about screentime-related conflicts in families, low frustration tolerance, impaired empathy, school failure and depression. Computer game addiction or pathologic internet use are well known phenomena and can be compared to drug addiction.

In USA, doctors who see pediatric patients are recommended always to ask about their patients daily screentime. The American Academy of Pediatrics have given strict recommendations to limit the screen-time.

This symposium is acutely needed to educate doctors, politicians, decision makers, opinion leaders, journalists etc about the latest research in the field of ICT-technology (Information Communications Technology).

and social medias medical consequences for children.

Child development depends on the interaction with the surrounding world – what is presented to them. Decisions about children and electronic technology must be based on the latest research and the best for the children. If research does not yet have the answer, we have to be cautious since children are sensitive.

The symposium will contribute to better knowledge for a good balance between digital and real life.

You are cordially invited to participate!

Hugo Lagercrantz and Åse Victorin

THE ORGANIZING COMMITTEE

Programme

Child brain development, learning and digitalization

Den uppkopplade barnhjärnan

Monday 27th November, 2017

- 08.30–08.35 **Introduction.** Hugo Lagercrantz, Stockholm, Sweden
- 08.40–09.05 **New media – from Socrates to Steve Jobs.**
Hugo Lagercrantz, Stockholm, Sweden
- Chair: Hugo Lagercrantz**
- 09.05–09.45 **Cracking the language.** Patricia Kuhl, Seattle, USA
- 09.45–10.15 **Reading acquisition.** Tzipi Horowitz-Kraus, Cincinnati USA/Haifa Israel
- 10.15–10.45 Coffee/Tea, Refreshments
- 10.45–11.15 **Mathematics and the brain?** Torkel Klingberg, Stockholm, Sweden
- 11.15–11.45 **Computer games and violence.** Predrag Petrovic, Stockholm, Sweden
- 11.45–12.15 **Risk and side effects of digital media use by children.**
Manfred Spitzer, Ulm, Germany
- 12.15–13.15 Lunch

Sessions in Swedish

- Chair: Gunilla Bolinder, Svenska Läkaresällskapet**
- 13.15–13.45 **MUGI, Motorisk utveckling som grund för inlärning.**
Ingegerd Ericsson, Malmö, Sweden
- 13.45–14.15 **Små barn och skärmtid – kan psykologin ge några svar?**
Mikael Heimann, Linköping, Sweden
- 14.15–14.45 **Penna eller dator?** Håkan Danielsson, Lund, Sweden
- 14.45–15.15 **Vad ser vi i elevhälsan?** Åse Victorin, Göteborg, Sweden
- 15.15–15.45 Coffee/Tea, Refreshments
- 15.45–17.00 **Paneldiskussion**
Gunilla Bolinder, moderator, Svenska Läkaresällskapet
Anna Bärtås, Barnläkaföreningen
Åsa Fahlén, Lärarnas Riksförbund
Robert Fahlgren, Lärarförbundet
Josef Milerad, Skolläkarföreningen
Ingrid Pramling Samuelsson, Göteborgs Universitet

General information



The Society's building in Stockholm

When & Where?

27th November 2017 at the Swedish Society of Medicine (SSM), Klara Östra Kyrkogata 10 in Stockholm, Sweden.

Lunches and coffee are included in the participation cost and will be served at the SSM.

Symposium secretariat

Annie Melin, the Swedish Society of Medicine (SSM), P.O. Box 738, SE-101 35 Stockholm.

Phone +46 (0) 8 440 88 78, annie.melin@sls.se,
Symposium website: <http://www.sls.se/bz97>



The conference Hall

Social programme

Monday 27th November 2017 at 6.00 p.m

Buffetdinner at the Swedish Society of Medicine.

Pre-reservation is necessary!

Speakers abstracts

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New media – from Socrates to Steve Jobs

Hugo Lagercrantz, Karolinska Institutet

The introduction of new media like the telegraph, the telephone and television aroused a lot of protests and it was suspected it could cause brain damage. Even Socrates said that it is far better with “an intelligent word graven in the sould than a word written in water of ink.” The new media of today interact with the connection of the brain in a much more invasive way than previously. This connection consists of billions of neurons which are connected to each other by trillions of synapses. They form hubs for processing sensory, visual and auditory impressions, which can already be detected in newborn infants. They provide neuron clusters, comprising a self-referential area, autobiographical memories and consciousness. These areas expand during development and make it possible to communicate with the outside world and form social networks. Through the evolutionary development of reading and writing, humans involve more external sites in their quest to gain memory and knowledge. This outsourcing has exploded during the last few decades by the use of interactive media and the Internet. One of the main questions of this symposium is to discuss to what extent this can affect brain development, cognitive functions and emotions.



Hugo Lagercrantz is senior professor of pediatrics at the Karolinska institutet. He was direction of the neonatal unit at Astrid Lindgrens Children’s Hospital. His research interests involve the stress of being born, sudden infant death syndrome and during the last years brain development. He claims that too much screen exposure during childhood can disturb neuronal wiring and synaptogenesis. He has published books in popular science most recently “Infant brain development” (Springer 2016). He is editor-in-chief of Acta Paediatrica.

Cracking the language

Patricia Kuhl, Washington USA

Studies of the infant brain illustrate infants' exquisite sensitivity to linguistic signals early in life, and how social interactions involving language are essential to learning. In this talk I will describe the role of the social brain in early language learning, addressing the impact of the digital age on adult-infant interactions.



Dr. Patricia K. Kuhl holds the Bezos Family Foundation Endowed Chair in Early Childhood Learning and is co-director of the UW Institute for Learning and Brain Sciences, Director of the University of Washington's NSF Science of Learning Center, and Professor of Speech and Hearing Sciences at the University of Washington in Seattle. She is internationally recognized for her research on early language and bilingual brain development, for pioneering brain measures on young children, and studies that show how young children learn. She presented her work at two White House conferences (Clinton White House in 1997 and Bush White House in 2001). Dr. Kuhl is a member of the National Academy of Sciences, the American Academy of Arts and Sciences, the Rodin Academy, and the Norwegian Academy of Science and Letters.

She is a Fellow of the American Association for the Advancement of Science, the Acoustical Society of America, the American Psychological Society, and the Cognitive Science Society. Dr Kuhl's TED talk can be viewed at:

http://www.ted.com/talks/patricia_kuhl_the_linguistic_genius_of_babies.html

Reading brains, screen brains

Tzipi Horowitz-Kraus, Cincinatti USA/Haifa Israel

Child development is characterized by a vast synaptogenesis, especially related to language and cognitive development, both of which are critical for reading acquisition later in life. Since reading is a relatively new human invention, we aimed to pinpoint the neural circuits involved in this ability from early to late stages of development and specifically those related to executive functions, language, and visual processing. In a variety of studies, we used executive functions (EF)-based reading and language training to determine the effects on neural circuits supporting EF, language, and reading in 4–12 year-old children using fMRI and EEG. Together with improved language and reading abilities, the results indicate greater functional connectivity between EF and visual-processing brain regions during reading, as well as in a resting-state condition, and greater attention- and inhibition-related ERPs following the training. The importance of EF training and the role of EF in developmental disorders (such as dyslexia) and in normal development will be discussed. We will also introduce the possible effect of screen exposure in this process.

The relevance of your lecture to the congress concept:

- The role of cognitive control and language processing in reading development
- The critical period of childhood in facilitating the basis of reading
- Screen vs reading time

3 key learning points:

- EF-based training improves language in preschoolers and reading in older children
- EF play a critical role in reading ability
- Screen time may compete with reading on utilization of neural circuits supporting reading

Key references

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5. Horowitz-Kraus T, Vannest JJ, Holland SK. Overlapping neural circuitry for narrative comprehension and proficient reading in children and adolescents. *Neuropsychologia*. 2013;51(13):2651–2662



Tzipi Horowitz-Kraus, PhD is an Assistant Professor of Neuroscience in the Faculty of Education in Science and Technology, the Chair of Excellence an Alon scholar and Director of the Educational Neuroimaging Center (ENIC) at Technion, the Israeli institute of technology in Haifa, Israel. She is also an Assistant Professor of Pediatrics in the Department of General Community Pediatrics and the Scientific Director of the Reading and Literacy Discovery Center at the Cincinnati Children's Hospital Medical Center in Cincinnati, Ohio, USA. Dr. Horowitz-Kraus is the PI on several Pediatric Neuroimaging Research projects, funded by the National Institute of Health (NIH) and other foundations (Promobilia foundation) in order to advance our understanding on neural circuits supporting learning and language in the developing brain.

The medium is not the message – on the pros and cons of computers for mental health and education

Torkel Klingberg, Karolinska Institutet

Information and communication technology (ICT) in general, and computers in particular, are increasingly present in our lives. A justified question is how this affects our mental health and education in children. However, it is important to analyze each aspect of the ICT separately, and differentiate between the medium and its content.

The computer can be of great benefit for mental health and education. We, and others have shown that computerized working memory training improves working memory capacity and reduce inattentive symptoms in children with attention deficits. We have also conducted trials showing how computers can be used to effectively teach mathematics to younger children.

The negative effects of ICT is likely the temporary distractions of phone calls and messages, and the overall time computer games can detract from other activities that in the long run are more beneficial for educational development.



Torkel Klingberg, is Professor of Cognitive Neuroscience at the Karolinska Institute in Stockholm, Sweden. Klingbergs work on child brain development, education and cognitive training is at the international front line with publications including Science, Nature Neuroscience, PNAS and Nature Reviews Neuroscience. He led the original studies demonstrating that working memory can be improved by training, and leads several large Swedish project on child brain development and academic abilities. He is head of a non-profit organisation, Cognition-Matters.org, and has written several books of popular science. www.klingberglab.se

Computer games and violence

Predrag Petrovic, Karolinska Institutet

Predrag Petrovic is a psychiatrist and associated professor in cognitive neuroscience at the Karolinska Institutet. He defended his Thesis 2002 on how cognitive mechanisms in the brain may affect pain processing, with professor Martin Ingvar as his main supervisor. He did his post-doc at University College London (UCL) 2005 to 2007 focusing on emotion regulation in the brain. Predrag then went back to Stockholm to form his own research group focusing on cognitive neuroscience and psychiatry. The research involves several different topics such as brain mechanisms related to the formation of beliefs, placebo effects, psychosis, ADHD and emotional instability. 2015 his book on emotional instability and the brain, “Emotional Storms” (“Känslostormar” in Swedish), was published. He has an ongoing collaboration with associate professor Andreas Olsson from Karolinska Institutet and professor Claus Lamm from the University of Vienna on violent video games and brain mechanism related to empathy and aggression. The present lecture will focus on the background to this research.



Predrag Petrovic is a psychiatrist and associated professor in cognitive neuroscience at the Karolinska Institutet. He defended his Thesis 2002 on how cognitive mechanisms in the brain may affect pain processing, with professor Martin Ingvar as his main supervisor. He did his post-doc at University College London (UCL) 2005 to 2007 focusing on emotion regulation in the brain. Predrag then went back to Stockholm to form his own research group focusing on cognitive neuroscience and psychiatry. The research involves several different topics such as brain mechanisms related to the formation of beliefs, placebo effects, psychosis, ADHD and emotional instability. 2015 his book on emotional instability and the brain, “Emotional Storms” (“Känslostormar” in Swedish), was published. He has an ongoing collaboration with associate professor Andreas Olsson from Karolinska Institutet and professor Claus Lamm from the University of Vienna on violent video games and brain mechanism related to empathy and aggression.

Cybersick! Risks and side effects of digital media use

Manfred Spitzer, University of Ulm

Digital information technology (IT) has become part of our everyday life. Drawing from studies in cognitive neuroscience, experimental psychology, education research as well as clinical research, I argue that there is a considerable negative impact of digital IT on mental functioning. Mechanisms include (1) “outsourcing” mental work from our brains into machines, (2) replacing face-to-face contact with digital contact, resulting in reduced empathy towards parents and peers, (3) distractions, such as multitasking and being online most of the time, resulting in dysfunctional attentional and thought processes, (4) giving away the control of our lives to gadgets, thereby increasing chronic stress, with its known negative impact on physical and mental functioning, (5) addiction and (6) lack of exercise and recreational outdoor activities, with its known detrimental physical and social effects. Furthermore, digital IT may cause short-sightedness (myopia), hypertension, diabetes, sleep disorders, depression, attention deficit disorder, and dementia.

With special emphasis on brain development in young age, and cognitive decline in old age, I will present examples to illuminate these processes and mechanisms that cause concern regarding the risks and side effects of the massive digital media use that is the norm in developed societies. In particular, I argue that these effects are long-term in nature and must be taken seriously now. Needless to say: I am not against the use of digital information technology per se. But I want to caution against the unrestricted and market-driven exposure of our most precious resource, the brains and minds of the next generation, on a large scale, to devices with strong risks and side effects which are either already known or are suggested by what we know about brain development and functioning.



Manfred Spitzer studied medical science (MD in 1983), psychology and philosophy (Diploma in 1984) From 1990 to 1997, Manfred Spitzer was Lecturer in psychiatry, Chief of clinical services and Director of the Section for Experimental Psychopathology at the Psychiatric Hospital of the University of Heidelberg.

Furthermore, he was Visiting Scholar at Michael Posner’s laboratory at the Institute of Cognitive and Decision Sciences at the University of Oregon (1992) and Visiting Professor at the Department of Psychology, Harvard University, teaching undergraduate and graduate students. (1989-1990; 1994) Since 1997, Manfred Spitzer has been Medical Director, Professor and Chairman of the newly established Psychiatric Hospital at the University of Ulm. His research activities focus on higher, cognitive functions at the interface between cognitive neuroscience, psychology, and psychopathology, using

multimodal neuroimaging techniques such as event related potentials, functional magnetic resonance imaging, transcranial magnetic stimulation, and experimental neuropsychological methods.

In 2004, he founded the Transfer Center for Neurosciences and Learning where he has held the position of Chairman.

As an internationally renowned scientist in brain research, Professor Spitzer is the author of several popular science books and more than 100 scientific papers in international journals. His current activities include a weekly TV appearance in the educational channel of Bavaria.

MUGI, Motor Skills Development as Ground for learning

Ingegerd Ericsson, Malmö University

Regardless of physical activity levels, sedentary sessions corresponding to two-hour screen use/day, increase the risk of obesity, inferior fitness, cardiovascular disease, lower self-esteem, and lower scholastic performance (Tremblay et al., 2011).

At the same time as sedentary behaviors increases, children's motor skills are reduced. Sport leaders describe how children need to practice common scapegoats, a skill they "just could" earlier. Automatization of fundamental motor skills (FMS) enables positive social interaction, which can counteract sedentary behavior and exclusion due to motor skill deficits. There is a connection between children's motor and cognitive development (Gottwald et al., 2016). In a consensus conference, 24 researchers conclude that automatization of FMS affects cognition and school performance positively in children and adolescents (Bangsbo et al., 2016).

The MUGI model in the Bunkeflo project shows that schoolchildren who had daily physical education (PE) and extra motor skills support improved gross motor skills (balance and coordination) and scholastic performance, so that a greater proportion of students (96%) became eligible for upper secondary school than students who had PE twice a week (89%) (Ericsson & Karlsson, 2014). The Malmö Commission Health Economics Analysis shows that daily PE would yield gains in increased production value and reduced healthcare costs by SEK 38,000 per student (Gerdtham, Ghatnekar, & Svensson, 2013).

Three key points:

1. Screen Usage = Sedentary behavior is a health risk
2. Daily PE and MUGI training positively affect school performance
3. Daily PE and MUGI training provide health economic benefits

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Ingegerd Ericsson is an associate professor in Sport Sciences at Malmö University. Her research interests concern relationships between motor skills, self-esteem and learning, especially regarding Physical Education. For 25 years she worked as a PE teacher and then developed the MUGI (Motor Development as a Ground for Learning) www.mugi.se. During her PhD studies, she joined the Bunkeflo project in 1999. In 2003, she defended her thesis Motor skills, Attention and Academic achievements. The follow-up study, after nine years of intervention, is published in the *Scandinavian Journal of Medicine and Science in Sports* and at Idrottsforum.org.

Screen time in infancy – Can psychology provide any answers?

Mikael Heimann, University of Linköping

The recent surge in availability of digital media has made media accessible even to very young children. Recent data from Sweden indicates that more than 25 percent of one-year-olds have used a digital device for playing computer games. We know very little of the effects that this early exposure of digital media might have on infant's social and cognitive development. What we do know is that infants have difficulty transferring what they have learnt from a two-dimensional screen to a real world three-dimensional setting, the so-called transfer deficit. However, we must also be aware of that new technologies also provide new tools for learning and collaborative play. Thus, it is not easy for parents to navigate in this new media landscape and to know what kind of strategies or rules one should adhere to. These issues will be addressed and the talk ends with some cautious advice: 1) Children are notorious curious and need to explore their environment but early in development they usually learn faster and better in a relational context; 2) Tablets is a complement, not the main road for learning for very young infants; and 3) For children with disabilities new technology might potentiate early socio-cognitive development.

References

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Mikael Heimann (PhD 1988, Pennsylvania State University, USA) is a professor of Developmental Psychology, Linköping University, Sweden. He has a background as a clinical psychologist and was professor and Head of a Centre of Child and Adolescent Mental Health, University of Bergen, Norway, from 2001 to 2005. Dr. Heimann's research focuses on infant cognition (imitation, memory and attention), early social and communicative skills (e.g.: children with cochlear implant), and developmental psychopathology. His interest also includes intervention studies aimed at increasing social interaction skills (e.g.: children with autism) as well as literacy (e.g.: children with autism, children with suspected dyslexia, "slow readers", and children with severe hearing disabilities).

Pencil or computer?

Håkan Danielsson, Lund

The lecture will examine the use of laptops and mobile phones in typical class room situations. It will show how the performance of the pupils learning are affected. It will show that taking notes is better done with pen and paper, that it is the lowest performers that are most negatively affected by the presence of mobile phones in the classroom and that even pupils without a computer will be disturbed by other pupils with a computer. The lecture will amongst others refer to works of Mueller and Oppenheimer (Princeton and UCLA), Sania and Weston (York University, Toronto) and Beland and Murphy (London School of Economics).



Håkan Danielsson works as a senior lecturer in History and Social Studies at the cathedral school in Lund. He is Coordinator and Teacher of the History Program – Higher Education in History. He is co-author of two textbooks on history teaching.

What do we see in school healthcare?

Åse Victorin, Göteborg

Psychiatric unhealth and poor school results are increasing problems among children and adolescents in Sweden. They complain of stress, anxiety, sleep disturbances and loneliness. When analysing the problem we often find an unsustainable lifestyle, for example too long screen-time. The youngsters lack adult guidance and are often given too much responsibility in relation to their maturity. The result is chronic sleep deficit, too long screen-time, irregular eating, too little of physical exercise and too little time spent outside in nature and with real human contacts.

The 2017 Nobel Prize in Physiology or Medicine award Jeffrey C. Hall, Michael Rosbash and Michael W. Young for their discoveries of molecular mechanisms that control circadian rhythms. The circadian rhythm of nature is extremely important to all living creatures. Longtime ignorance will lead to disease and psychiatric unhealth.

In school healthcare we meet this society problem as it becomes a medical problem. We have come to a point where we have to work actively, with a prophylactic approach, for a better lifestyle including raising the common knowledge for these problems. Politicians and medics need to collaborate for concrete general actions for schools, to raise the knowledge and awareness among children and, in particular, their parents. The aim being a good life balance and a sustainable lifestyle.

This lecture will give some concrete examples of actions to be taken to improve the current situation.



Dr. Åse Victorin is a specialist in Children and Youth Medicine and General Medicine. She has worked for over 20 years as a pediatrician and especially with childhood obesity, eating disorders and neuropsychiatric disorders. Since 2012 focused on prevention and health promotion work in student health care and research in the field of pathologic internet use. She is also an author of a health-promoting learning tool for schools, to educate children and their parents: QLeva – Help to health and learning (www.qleva.se).

Who was Berzelius?



Jöns Jacob Berzelius, one of the most prominent natural scientists of the 19th century, was born in 1779 in Väversunda, in the county of Östergötland in southern Sweden, a region with rich cultural traditions. Orphaned at an early age, he went to several fosterhomes and received his schooling in nearby Linköping. After graduating in medicine at the University of Uppsala, he moved to Stockholm, where he became assistant master without pay at the so-called »Surgical School«, and worked as a doctor for poor people. At the age of 28 he became professor of medicine and pharmacy.

In 1808 Berzelius was one of the seven men who founded The Swedish Society of Medicine »For the perfection of science through mutual mediation of knowledge and collective experience, for the promotion of friendly confidence between doctors«.

Berzelius have enriched our knowledge of nature of life phenomena, established the atomic weights of most of the known elements, presented his electrochemical theory for the understanding of the nature of chemical compounds and laid the foundation for the sciences of the chemistry of rock types.

He also found that elements combine with each other according to fixed numerical relationships. In addition to this, in his striving for order and method, with his talent for simplicity and clarity in expression, he created the chemical symbolic language in 1813, which since that time has been an essential instrument of chemistry.

With time he became a practised lecturer but preferred to express himself in writing and this he did superbly. Impressive are the great scientific works where he also demonstrated his interest and ability to spread knowledge about the latest advances of natural sciences.

Berzelius delight in research and debate was united with a great humility before the great scientific questions. Both his attitude and artistry of formulation is illustrated by the following passage in his *Manual of Chemistry* (vol 3, 1818):

»All our theory is but a means of consistently conceptualizing the inward processes of phenomena, and it is presumable and adequate when all scientifically known facts can be deduced from it. This mode of conceptualization can equally well be false and, unfortunately, presumable is so frequently. Even though, at a certain period in the development of science, it may match the purpose just as well as a true theory. Experience is augmented, facts appear which do not agree with it, and one is forced to go in search of a new mode of conceptualization within which these facts can also be accommodated; and in this manner, no doubt, modes of conceptualization will be altered from age to age, as experience is broadened, and the complete truth may perhaps never be attained. But even if the goal can never be reached, let us never abandon our endeavor to get closer to it.«

Parts of this text is found in: Berzelius – Creator of the chemical language, by Carl Gustaf Bernhard, the Royal Swedish Academy of Sciences

History of the SSM building



In 1879, the Swedish Society of Medicine moved from what was then the home of Karolinska Institutet at Norr Mälärstrand to its own premises in Jakobsgatan in Stockholm. It soon outgrew this location and a search for new premises was resumed. On Walpurgis night in 1889, six men were inside the Katarina lift at Slussen in Stockholm.



A fault developed in the machinery, causing the lift cage to fall. One of the passengers, Carl Westman, was injured, but a fellow passenger, Johan Rissler, a surgeon and member of the building committee of the Society of Medicine, immediately assisted him.

In 1904, the Society announced an architectural competition for a building on a site it had purchased in Klara Östra Kyrkogata. The winner was Carl Westman, and the building was finished two years later.



The Society's building which dates from 1906, was a breakthrough for the architect Carl Westman and the national romantic style architecture he favoured.

The building itself is work of art – from its facade of handmade brick and Christian Eriksson's granite reliefs in the entrance to its mosaic floors, carved balustrades, chandeliers, and ventilation grilles – all Westman signatures. The building today is a Swedish, turn of the century architectural treasure.





Svenska
Läkaresällskapet

Svenska Läkaresällskapet · Klara Östra Kyrkogata 10 in Stockholm

Phone +46 (0) 8 440 88 60 · Fax +46 (0) 440 88 99

www.sls.se/bz97