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STRÖMSTAD AKADEMI
Nordiskt institut för avancerade studier

Abstract Vetenskapsfestivalen i Strömstad den 2-4 juni 2025

Ketogenic Diet and Epilepsy 2025

A.G. Christina Bergqvist MD Professor of Neurology and Pediatrics Children's Hospital of Philadelphia Perelman School of Medicine at the University of Pennsylvania

Epilepsy, (recurrent unprovoked seizures) is a heterogenous disorder that affects 1% of the population, about 50 million people, and is now a recognized world health problem. Although most people with epilepsy live normal lives, about 30% of those diagnosed do not respond to standard drug-based therapy and become treatment resistant. People with Treatment resistant epilepsy (TRE) are at higher risk for morbidity, poor quality of life and early mortality. After failing three medications the chance of seizure control with further medication trials is disappointingly poor ~ 3%. Alternative therapies are therefore used including epilepsy surgery, stimulators, plants, and diets. The ketogenic diet (KD), a more than 100-year-old treatment of TRE is now increasingly used across the world as a metabolic treatment of epilepsy. A high-fat, low-carbohydrate, adequate protein diet induces ketosis and reduces seizures through fatty acid oxidation, TCA cycle, mitochondrial upregulation, changes in neurotransmitters like GABA and glutamate, and alterations in MTOR regulation, epigenomics, and microbiome. Use of the KD is labor intensive, and in the past have been offered only to the most motivated and resource able patients/families. Much advancement has been made in how to manage and manipulate this treatment effectively to minimize side-effects and provide support for ultimate success. This lecture will review the progress we have made using KD therapies in treatment resistant epilepsy.

Dynamic Innovation Capital in a local context.

The "Arboga Case".

Action based research with local "innovation capital" as a perquisite for regional development and value growth.

Per Staffan Boström, Doctor of Technology

The purpose with this "case" is to demonstrate how action-based research with a resource dialogue can increase people's involvement in local innovative projects. This paper refers to a first phase in a five-step model. It also serves as an example of theory development about "dynamic innovation capital" (DINNCAP) – the transformation of people´s knowledge capital to innovation capital.

Contemporary education in the subject of business economics primarily deals with models for 'demand' and 'supply' that follow economic assumptions about heterogeneity and

exogenous growth. (Bain, 1956, 1959) An increasingly "knowledge-driven" and "innovation-driven" societal development, however, raises the need for business education - and research - that can be expected to explain and make aware how more locally endogenous, individual, and human influences can meet future demands for local growth and resilient projects.

A locally identified 'research gap' that should be filled with broad empirical research concerns what, how, and why the accumulated knowledge and innovation capabilities of an aging senior population can contribute to positive local development in a range of different societal areas. In particular in areas where traditional public services have disappeared and where municipal resources are insufficient.

The 'Arboga case' is carried out using a well-known five-step model called 'a practical framework (Grant ,2001) in a modified version' also called 'The Resource Dialogue Model' (Boström, 2015) This paper presents an initial step in the model carried out over six months in 2024 with 150 participants in Arboga, resulting in the establishment of three projects with a long-term focus.

How do citizens think about population decline?

Lars Broman, honorary professor at Strömstad Academy

Today, as far as I have been able to ascertain, there is no clear answer to the question in the title. However, there are hypotheses, more or less plausible. But it is important to know what young people of childbearing age think. Perhaps a research study on the issue would be in order? Politicians and the media are very concerned today about low birth rates. Who, for example, will take care of the large group of 80+ people in the future? I have previously wondered why this concern may be unfounded. It has also recently been suggested that AI will eliminate many more jobs than are potentially created. Then the problem will not be that the proportion of people of childbearing age in the population may be too small, but rather that it may be difficult to find meaningful activities for them between education and retirement. Broman.lars@outlook.com

Belief/Supposition and knowledge in design science

Per Flensburg, professor of informatics

A traditional scientific theory involves a supposition that things are in a certain way. When it has been verified, one knows, usually with a 95% probability, that it corresponds to reality.

Design involves creation, something reminiscent of formulating a research question in a traditional scientific investigation. When the designer sketches/outlines his design, he believes that it will work when it is finished and when it is evaluated, the designer knows whether it works or not. It is usually the case that it works for some people and in some situations, but if it is used in a situation that was not foreseen, it does not work as intended (Gäre, 1999, 2003). The interesting thing, however, is why the designer believes a certain design works. On what grounds does the designer believe this? An important basis is experience, which is why many designers specialize in one type of artifact, within in specific area when it comes to IT systems.

The result of a design is a prototype and description of how the finished product will be manufactured. This applies to the design of physical products. In the case of information

systems, there is basically only one copy, although it can be copied in several versions. The result of the design is a prototype that in appearance and function exactly resembles the finished product, yes, it can even be the finished product. The designer believes the prototype is what is needed, but it is only when it has been accepted that the designer knows that the artifact is complete.

That a design is correct means that it works and is appropriate. Philosophically, it is based on pragmatism. What characterizes pragmatism is that the meaning of a statement, an idea, method, theory or hypothesis is verified in its concrete consequences, its applicability, function, usability and relationship to accepted facts.

Pragmatism was founded by Charles Sanders Peirce (1839–1914), who coined the term in 1878 in an essay in Popular Science Monthly. It was popularized by William James in Will to believe (1897), Philosophical conceptions and practical results (1898) and Pragmatism (1907). Among educators, John Dewey is one of the most influential pragmatists, with Studies in logical theory (1903). The philosophy of the philosopher and social psychologist George Herbert Mead is also usually considered pragmatist. It also had a great influence on social scientists such as the sociologist C. Wright Mills.

In pragmatism, “truth” is the same as “purposefulness”. This means that the function and thus the truth are situational, unlike traditional science which seeks “eternal truth”. But what characterizes all science is the readiness to reject previous theories and ideas with sufficient arguments. The difference is that the paradigms in normal science are more extensive and long-lasting, while an artifact in the form of an information system is in principle found in a single instance. Its correctness is dependent on the context and consequently the artifact and its evaluation are not universally valid.

Litteratur

Gäre, K. (1999). *Verksamhetsförändringar i samband med IS-införande*. Univ.

Gäre, K. (2003). *Tre perspektiv på förväntningar och förändringar i samband med införande av informationssystem*. Univ.

Forest CO_2 absorption – a disaster

Per Flensburg, professor of information systems

Forest growth has decreased significantly since 2018. Why has the absorption of CO2 by living trees decreased? There are two approaches: In the first, logging is done to obtain maximum timber output. However, when logging, all carbon dioxide in the trees is considered to immediately return to the atmosphere. However, construction timber, furniture and other things that are used are excluded. The second approach is to let the trees grow and store carbon in themselves. However, after about 60-70 years, the forest does not absorb any more carbon dioxide and is carbon neutral.

With the first method, which is advocated by the forest industry, there is a constant absorption of carbon dioxide. About 35 Gt CO2 equivalents are substituted mainly by biofuel. The second method is advocated by environmental organizations and maximizes carbon storage. Scientists cannot decide which is best.

The reasons for the reduced growth are climate change in combination with increasing removals from the forest at a rate that was justified by what was known at the beginning of the millennium. Climate change has led to increased summer drought, storm felling, forest fires, insect infestations, winters that are too mild for spruce, and the weather is more unpredictable.

Contributing causes that are not climate-related are too large game populations, increasing restrictions for nature conservation reasons, mechanization has sometimes led to standardized measures, increased bureaucracy and political resistance. When forest felling has increased significantly, growth decreases when fewer trees are left to grow. However, the design of Swedish forestry causes damage to the forest that has contributed to increased forest death - reduced growth.

The forest's gross absorption of carbon dioxide amounts to approximately 160 million tons of carbon dioxide per year. Deforestation and natural loss give rise to emissions of approximately 120 million tonnes of carbon dioxide per year. The net uptake of carbon dioxide in the forest's living trees, dead organic matter and soil amounts to approximately 38 million tonnes of carbon dioxide per year. In addition, there is a net carbon sequestration in wood products.

Carbon flows in forests are very large compared to emissions in other sectors. Deforestation levels are driven primarily by global demand for forest products and approximately 80 percent of wood products, which include both sawn timber and pulp and paper, are exported.

Deforestation is counted as immediate emissions (except when the forest raw material is used for long-lived wood products. Carbon sequestration in wood products is assumed to have general half-lives, for paper and board it is 2 years, boards 25 years and sawnwood 35 years, IPCC 2019a, chap. 12). The emissions that occur later when the same biomass is used for energy have therefore already been recorded.

Using this method of calculation, the forest industry causes carbon dioxide emissions of just over 100 million tonnes per year, which is more than twice as much as all other climate emissions combined.

Emissions from other industries and from traffic, etc., total around 44 million tonnes per year. This differs from the global average, where fossil fuels account for around 80 percent of emissions, while agriculture and forestry account for around 20 percent.

Although the emitted carbon dioxide will resume when new forest grows back on the clearcut, this will only happen in 8-13 years, which is far too late; to cope with the climate crisis, we must reduce greenhouse gas emissions in principle NOW. Emissions from the forest sector therefore pose a similar climate risk as fossil emissions.

Faith and knowledge in research

Anders Gustavsson

A starting point for this theme project is the idea that faith and knowledge in research were previously two opposite poles that could not be reconciled. Faith did not belong in research, but knowledge was what applied and it presupposed observable facts that were considered true. However, there are signs in the current debate that indicate that the concepts of faith

and knowledge have been getting closer to each other in research. It is not as easy to claim that knowledge only contains truths but also to a certain extent contains faith in the form of speculation. Researchers in several scientific fields will write about this theme. Research presupposes that it involves processes where the results are not given once and for all. If everything had already been explored and the final truth was known, no new research would be needed. Even in the natural sciences, previous research can be questioned by new discoveries. The author Björn Ranelid has argued that generally accepted scientific truths, such as the Big Bang theory and the theory of evolution, are based on beliefs rather than on scientific evidence. As a humanist, I study people's beliefs about what is perceived as supernatural. This can apply to both the essence of folk beliefs such as ghosts and goblins and religious beliefs about a divine existence that has a relationship with people on Earth. For me, the question is not whether the supernatural beliefs are based on an actual reality or not, but what they mean to the people who embrace such beliefs and who express it through rituals and stories to other people, including the field researcher.

High time to take AI seriously

Olle Häggström

The extraordinarily fast AI development that we are witnessing today is a result of the race that the leading AI companies are engaged in, with strong market and other incentives to push full speed ahead. Further acceleration, perhaps by orders of magnitude, is to be expected as we are about to enter a new regime characterized by the powerful feedback loop of AI self-improvement. The societal consequences are potentially enormous, possibly including existential risk to Homo sapiens on time scales measured in single-digit years rather than decades. Where this ends up is not written in stone, however, and as world citizens we have a choice: do we idly stand by and watch how the drama unfolds, or do we raise our voices regarding the unacceptability of having a small number of American and Chinese AI companies acting in ways that put our entire civilization at risk, along with the continued existence of our species and the rest of the biosphere?

The Invasive Man

Anders Johnsson

The book The Invasive Man (Den Invasiva Människan) explores the economic, social and technological drives that have enabled humanity’s growth, but also led to some of the greatest challenges of our time, such as overpopulation, resource scarcity and ecologic degradation. Through historical analysis and future scenarios, the book asks the uncomfortable question: How can we manage our invasive nature to secure a sustainable future for future generations? The book aims to create debate about how we can balance our development with the Earth’s limited resources and the need for a sustainable life.

The book holds 220 fact-packed pages with lots of numbers and diagrams. The Swedish author Tage Danielsson is said to have said that “If you can’t look back and don’t dare look forward – you have to look up.” The book is thus divided into three sections, where Section 1 is a brief description of human development over the past 70,000 years. Section 2 is about the future and finally Section 3 is about what we (in the author’s opinion) should do to ensure that our descendants can hand over the earth to future generations. Section 1 can be said to be the most important, because if you don’t know how things have become the way they are today, it is also difficult to understand how things might be in the future. The

author's experience as environmental manager in PEAB's western region is that knowledge of history in general and knowledge of the explosive population growth during the 19th and 20th centuries was low among Peab's employees (and also among other people). I will therefore spend 15 minutes describing how humans have gradually increased in numbers since the Stone Age, both in number and in percentage terms per year, from 0.1 per thousand per year to a maximum of 2 percent per year. The aim is to open the eyes of those who have not understood how quickly we humans have increased in number over the centuries, and especially over the last 300 years.

From the debate about low birth rates that has been going on in the press recently, the debaters do not seem to be aware of the fact that the world's population growth continues to be around 75,000,000 people per year, which roughly corresponds to a new city of Uppsala every day.

Heritage and armed conflicts

Bo Anders Lagerqvist

The presentation assumes that cultural heritage is often a strategic goal in war situations, and that in post-war reconstruction efforts, cultural heritage has an even more important role. From the Swedish side, there is experience of this through the Cultural Heritage Without Borders Foundation, which was established in 1995 due to the Yugoslav wars, and the recently formed organization Blue Shield Sweden.

War is a chaotic situation ruled by its own logic completely estranged from a normal civilized society. There are however ambitions that in a post-war situation, be able to define and prosecute war crimes.

International law regulates the conduct of belligerent and neutral states in war and under occupation. The complex of rules consists largely of protective rules, which are collectively known as *international humanitarian law* in armed conflicts. Apart from the c*ustomary rule* of international law, it is the Geneva Conventions (1949) and the Hague Convention (1954) that are the formal frameworks to be used to prosecute war crimes. From 2002 through the International Criminal Court, and before that through specialized tribunals.

The presentation ends with a reflection on what cultural heritage is, its importance for us as individuals and as a group.

Overpopulation – the greatest threat!

Dag Lindgren. Professor emeritus

The greatest threat for the future of Mankind is that we have become too many. It has happened very fast and still the population is growing. We are unable to control the consequences, e.g. it is now evident the global temperature will now or in a few years pass the limit regarded as desirable - less than a decade ago all countries agreed on the target. Overpopulation ("överbefolkning") is correct word for describing the situation. Still the Swedish government and authorities, including "Naturvårdsverket". do not use that word. Neither does UN.

The closing of schools

Åsa Morberg

The article is about the closing of schools, a national trend in Sweden. All over Sweden, from Luleå in the north to Laholm in the south, this happens. Action groups are formed and fight to preserve their schools. The article describes the action groups' struggle and the results of school closings. The trend of closing village schools is completely unique internationally. The investigations that are carried out are not without preconditions. Myths about village schools often form the basis for criticism. Research results are interpreted by investigators who are not trained as researchers and the interpretations that are made are biased. An alternative to closing is to invest in making village centers out of schools. Since closings are usually due to financial problems, the development of village centers can provide funds from activities other than schools. Closings need to be the last measure that should be taken.

From belief to knowledge from an innovation point of view

Sarah Philipson

In this paper I tell you how my interest in innovation arose during my many years in industry and how it later became the core of my teaching and research. Then how from these studies and my teaching there became an increasing focus on the process of understanding how new knowledge arises to achieve new products, businesses, etc., in short how we develop knowledge and sometimes scientific knowledge from our experiences and our exchange with others about these.

Languages in Georgia

Karina Vamling, professor of Caucasian languages

The Caucasus is the most linguistically diverse part of Europe, especially the North Caucasus. On the southern side of the Caucasus Mountains, Georgia is dominated by the South Caucasian or Kartvelian languages, which I will mainly focus on. In addition to the Kartvelian languages—Georgian, Megrelian, Svan, and Laz—several smaller indigenous languages are also spoken in Georgia, such as Abkhazian, Tsova-Tush, Ossetian, and Udi, as well as the larger languages, Armenian, Azerbaijani, and Russian.

What makes the Caucasian languages so interesting to linguists? There are several reasons for this, one is that the Caucasian languages do not belong to the Indo-European, Semitic, Altaic, or other language families. In addition, there is disagreement as to whether the Caucasian languages constitute one or three language families (Tuite 1999, Chukhua et al. 2023) and there do not appear to be any related languages outside the Caucasus region. One of the difficulties in studying the relationship between these languages is that the Caucasian languages were not used in writing until the mid-to-late 19th century, making it difficult to compare earlier forms of the languages (Carling 2021). Georgian is the only exception. The language has been preserved in writing since the 5th century (Vamling 1998), written in the oldest form of the Georgian alphabet, mrglovani, which is still used by the Georgian Orthodox Church. The Georgian alphabet is phonemic and was created for the Georgian language, but its origins are still unclear. It may have been created in connection with the Christianization of Georgia in the mid-4th century. The language is unusually conservative and has changed very slowly. The oldest texts are still understood by Georgians today.

Describing Georgian grammar is challenging for modern grammatical models, given the language's extremely complex verb forms and sentence structures (Bolkvadze & Kiziria 2023). In addition, Georgian is known for its long initial consonant clusters, such as vprtskvni 'I peel it' and brts'q'inavs 'it shines'.

The connection between language and identity is very central in Georgia (Vamling 1990, 2021). This became evident not least during the last years of the Soviet era, when the fight for the status of the Georgian language in relation to Russian became a unifying issue for the independence movement.

Announcement of a new group with theme focus on Natural Sciences/Life Sciences

Marylou Wadenberg & Peter Fritzell

The Theme Group was initiated by the Academy members Pharmacologist Marylou Wadenberg and the Spine Surgeon Peter Fritzell, as a response to the Academy proposal for an initiation of theme groups.

The group was started with the objective of being a place for Academy members in areas of natural sciences/life sciences, with a main focus on life sciences, medicine and drug discovery, to get together for discussions/presentations from a strictly natural scientific perspective.

The group holds meetings that are digital and has so far been in a start-up phase. The format has been suggested to have brief presentations along the lines as stated below:

- My area of expertise
- Current status
- Current challenges
- Future developments in the field/analysis
- Q&A + discussion

In addition, the group plans to invite scientists in relevant fields for presentations on recent interesting and cutting edge findings. These meetings will be announced on the Academy website (under Current events) and be open to all Academy members. Presentations can also be published in the Academy Newsletter.

The group will also address issues on how to connect in general with scientists and students in natural sciences outside the Academy, as well as on how to find funding when needed for planned activities.

Currently the following Academy members have announced an interest in being part of the group: Margareta Berg (orthopedic surgery), Ulf Berg (organic chemistry), Peter Fritzell (orthopedics and health economics), Abdul Mohammed (behavioral sciences), Marylou Wadenberg (pharmacology), Urban Waldenström (gynecology), Lennart Wetterberg (psychiatry) and Peter Währborg (internal medicine). More Academy members in fields of natural sciences will be contacted and invited as the group gets up-and-running.

Marylou (experimental psychopharmacology/drug discovery) will give a brief presentation as an example under the heading: A 'new' drug for the treatment of schizophrenia.

We will circle back with reports on our activities in the group and welcome additional individuals interested in being part of the group.

Theme: Technology assessment

Rune Wigblad

The world is facing sweeping technological shifts, and a geopolitical paradigm shift. The combination creates an instability we have not seen in a long time. In this situation, Sweden needs better technology assessments!

Today we receive good up-to-date information from Statistics Sweden, including on economic developments, such as unemployment, inflation, price developments, government debt, etc. There is nothing comparable about the rapid technological developments in the world, which affect us at least as much. For example, the EU and Sweden were surprised by the sharp competition from Chinese electric cars. The same applies to China's production of batteries, which fell in price and increased their performance. Sweden needs a Technology Assessment Council for ongoing reporting of technical breakthrough analyses.

The lecture addresses a couple of examples of how breakthroughs are handled by politicians. The conclusion is that our politicians need better information for their decisions, so that they can be proud of them. Strömstad Academy approached the Ministry of Climate and Work Life with this message and representatives at the ministry referred to Vinnova. Vinnova subsequently received new money based on a report and has published another detailed report that focuses on Sweden's strengths, instead of analyzing intelligence concerning technological advances in our world. However, Sweden is a small country in the world and most technological development takes place in other countries.

Within the special technology area of AI (Artificial Intelligence), there was new thinking in a report commissioned by the Ministry of Finance. The AI Commission proposes that Sweden strengthen our technical expertise at embassies, via "Technical Attachés", a phenomenon that before the year 2000 had the task of monitoring intelligence concerning technological development and breakthroughs. This should be a guideline, not only for AI, but also for building expertise in other technology areas. Such reporting to the public in Sweden could create a new form of public education in technology. Sweden needs this, not least within the school system, where interest in technology is very low.

The seminar will discuss what technological areas that are the most urgent to bring knowledge about to the public and the school system.

Why does it hurt?

Peter Währborg

There is a significant difference between short- and long-term pain, especially with regard to the investigation and treatment of these conditions. Acute pain, e.g. in connection with an injury, traffic accident or transient inflammation, is relatively easy to treat. This type of pain, as a rule, has a specific localized cause. Long-term pain, on the other hand, is more complex where a number of factors can play a significant role such as psychological and social factors, but not least changes in the nervous systems that have the task of mediating (i.e.spino-thalamic system), but also inhibit the progression of pain (i.e. Diffuse noxious inhibitory controls, DNIC). More than twenty percent of the population in our country, as well as in the rest of the world, suffers from long-term pain. Care, treatment and rehabilitation efforts in

the health care system are not at all proportionate to either the occurrence of long-term pain or the significant suffering the patient is suffering from. There are different types of pain, which are described and explained. Pain is a complex problem that cannot be measured by any simple measure other than the patient's description of their experience. In this lecture, the path of pain, the Via Dolorosa, from the periphery to the brain and its experience of pain is described. This knowledge is relatively new and partly revolutionary. The same applies to the fact that much knowledge has been developed that intends to explain the "seat" of pain in the brain, a new medical revolution is waiting around the corner. An exciting and still partly unexplored journey awaits not only research but also all those who suffer from this scourge.