

Children's eyes in focus

Support unique Swedish research into vision and dyslexia



**MARIANNE
BERNADOTTE
CENTRUM**



The Marianne Bernadotte Centre is a part of Karolinska Institutet, which is one of the world's leading medical universities. Our mission is to contribute to the improvement of human health through research and education. Karolinska Institutet accounts for over 40 per cent of the

academic medical research conducted in Sweden and offers the country's broadest range of educational programmes in medicine and health sciences. Since 1901 the Nobel Assembly at Karolinska Institutet has selected the Nobel Laureates in Physiology or Medicine.

Marianne Bernadotte:

A very important task



In January 1990 we – my husband Sigvard Bernadotte, a Swedish prince by birth, and myself – initiated the Sigvard and Marianne Bernadotte Research Foundation, with the aim of supporting pediatric ophthalmology in Sweden and to establish a research centre at Karolinska Institutet in Stockholm. During the more than twenty years that have elapsed many important advances have been made and new insights acquired. The dedicated researchers at the centre have been active in many different fields. The focus of much of their work has been on the study of eye movements.

One of their most remarkable discoveries concerns the link between dyslexia and irregular eye movement. This research is now being intensified and the Foundation has therefore decided to expand its research investments by creating, with support from Karolinska Institutet, the Marianne Bernadotte Centrum for research into dyslexia and pediatric ophthalmology. This will need additional resources and funding. I would therefore kindly ask you to spend a few minutes learning more about this task, which for me is one of paramount importance.

Yours faithfully



Marianne Bernadotte

Countess of Wisborg

MD h.c.



The Marianne Bernadotte Centrum

The Marianne Bernadotte Centrum is part of Karolinska Institutet in Stockholm and undertakes research in ophthalmology, optometry, orthoptics and linguistics. It focuses on four main areas of research: the development of eye movements, the pediatric eye programme, and the basic and the functional eye movement programmes. The research director is Professor Jan Ygge.

In order to realise the plans for the new Marianne Bernadotte Centrum, additional financial resources are needed. At the moment the research is supported by the dividend from the Foundation's funds with a total equity of SEK 80 million. This enables about SEK 2 million to be allocated each year to the centre, covering a number of the research posts, some of the rent for its premises and its operations. When the Marianne Bernadotte Centrum is complete it is estimated that about SEK

5 million will be needed each year for its support, based on invested funds of SEK 200 million.

Eye diseases in children

Impaired vision and eye disease are common among the very young: more than one-third of the patients visiting eye specialists are children. Vision improves rapidly during the first few years of life but this development can be disturbed by inadequate visual stimulation resulting from eye diseases of various kinds. What most conditions share is the need of more research and knowledge, as well as better methods for early identification of impaired vision.

Impaired vision is most often caused by refractive errors and strabismus, which can be treated with spectacles and intensive visual training. Computer-based equipment may be useful in this respect. One per cent of all births in Sweden are premature. The brain and eyes of those

born prematurely are particularly sensitive to oxygen deficiency, which can give rise to injury. Not enough is known about the causes and more research is needed. More research is also needed in other less frequent eye diseases such as congenital cataract and glaucoma, and in pediatric neurological and metabolic conditions that damage the eyes and impair vision. At the Marianne Bernadotte Centrum new methods for rapid testing of vision in children are being developed, based on recording and analysis of eye movements. With proper equipment vision screening could be carried out at the child health care centres during infancy, allowing impaired vision to be detected and treated at a very early age.

Reading and writing problems – dyslexia

One out of fifteen children is affected by dyslexia, which means that there are usually one or two children in every class who suffer from it. Dyslexia limits their ability to learn to read and write. If remedial therapy is offered early, these children are able to learn to read more easily. It is important to identify children who are likely to suffer from dyslexia later on in life. Ideally one would like to be able to single out these children before they start to learn to read, which is usually during pre-school years.

The causes of dyslexia are almost never to be found in the eyes, but there are few

tasks that challenge our vision as much as reading. The eye muscles interact with perfect precision to guide our gaze and vision over the text and make sense of it. The whole process is incredibly rapid. It takes only about seven-hundredths of a second for a visual signal to travel to the brain, where the information is subsequently interpreted.

Irregular eye movement seem to offer one indicator of future dyslexia. The problem is how to detect these disturbances quickly and efficiently in children who have not yet learnt to read. This is a real challenge for researchers in dyslexia at our centre.



Recording eye movements using infrared light reflected from the eyes to sensors in a monitor (photo: Tobii Technologies)



The secret life of gaze

Researchers at the Marianne Bernadotte Centrum have specialised in study of the secret life of our gaze. The Centre possesses advanced equipment for measuring how the eyes move over text and other visual presentations. There is a strong link between visual perception and eye movements. Detailed eye movement studies enable the researchers to learn more about functions of the brain.

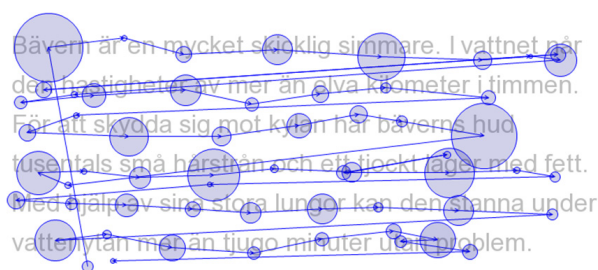
Reading is a three-stage process, divided into fixation, when our gaze is still and we absorb what we see, saccades or rapid movement forwards in the text to the next fixation, and regressions when we glance back over the text to confirm or repeat what we have just read. When a text is difficult, fixations are longer, saccades are shorter and regressions are more frequent.

The dyslectic's dilemma

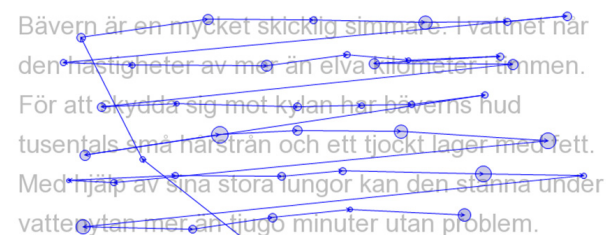
It is now well established that dyslexia is

linked to shortcomings in the way the brain interprets language elements. This makes reading a laborious process for dyslexics, with very long fixations, shorter saccades and more regressions during the process. Eye movements therefore reflect the problems they experience in interpreting a text.

DYSLEXIC



NORMAL



Eye movements in a dyslexic and a normal reader. The coloured circles indicate fixations (the larger the circle the longer the fixation) and the lines between them saccades. Note the longer and larger number of fixations and the shorter saccades in dyslexics.



The board of the Sigvard & Marianne Bernadotte Research Foundation: Back row: Christina Lagergren MD; Professor Jan Ygge; Ulla-Britt Schützler-Peterson, University Secretary; Professor Anders Persson; Gunilla Stenberg Stuckey, Principal. Front row, seated: Sven Wallgren, CEO; Professor Gunnar Lennerstrand; Marianne Bernadotte MD h.c.; Professor and Nobel Laureate Torsten Wiesel.

The development of the Marianne Bernadotte Centrum

The overall mission for research at Marianne Bernadotte Centrum is to study vision and eye movements in order to understand eye and brain functions in health and disease. Additional financial resources would support research in these fields and assist in finding better methods and solutions. This would help the thousands of children with such problems in Sweden and ultimately the millions of young people in the rest of the world. The centre needs additional expertise in neuropsychology, speech therapy and educational studies, for instance, to enhance its research capacities.

The development of research equipment has to be monitored and the equipment of the centre continuously updated.

The premises at Karolinska Institutet will need to be extended from the current 4,000 sq. Ft. To 10,000 sq. ft. in order to provide space for more laboratories and offices.

Who to approach if you want to offer support

Contact person:

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You can also contribute by making a direct payment to the Foundation's bankgiro 5707-6051 or plusgiro 74 83 50-6.

