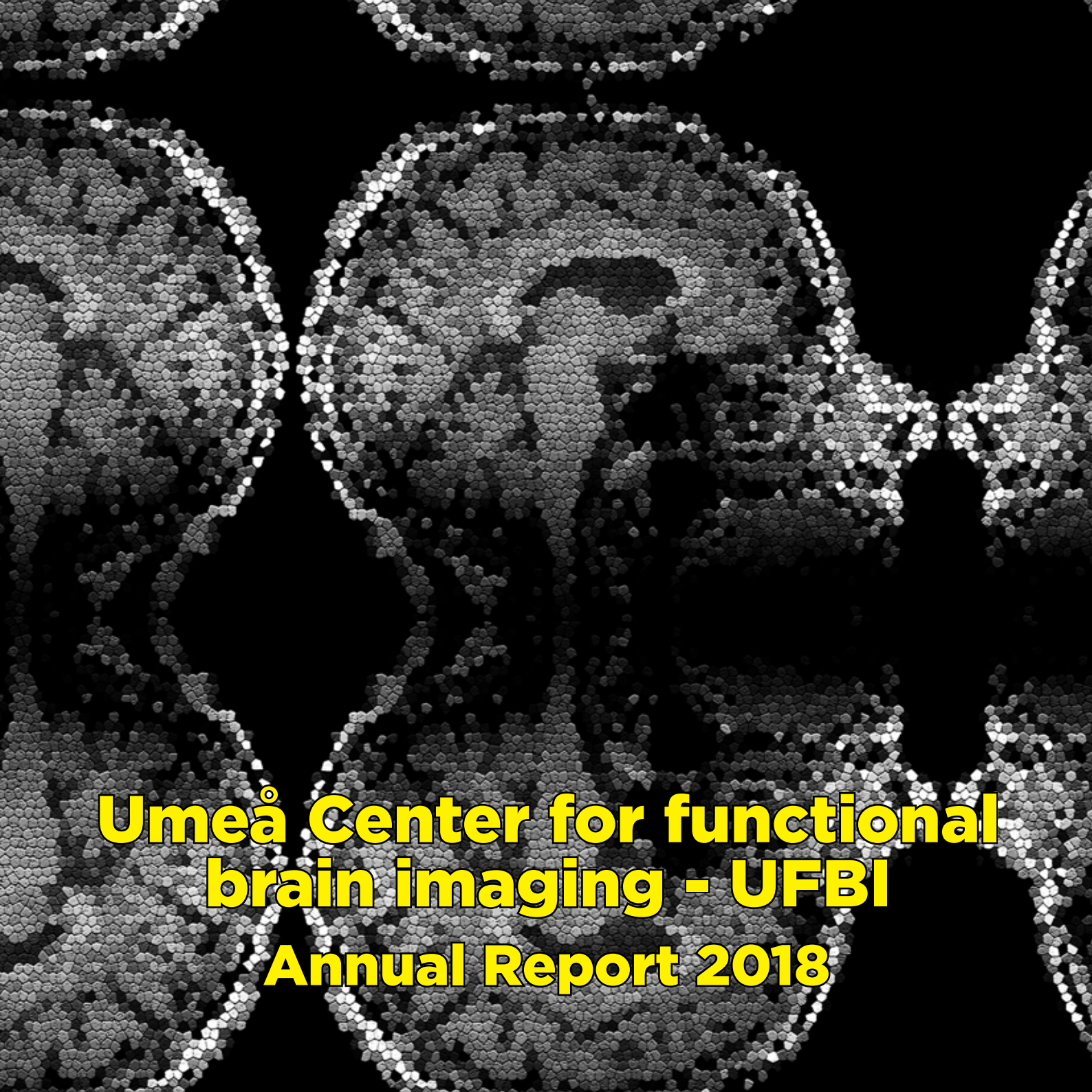


Umeå Center for functional brain imaging - UFBI

Annual Report 2018

UFBI 2018 Annual Report

Editor: Lars Nyberg. **Layout:** Mikael Stiernstedt. **Cover:** Mikael Stiernstedt. **Paper:** Olin matt 300g (cover), Olin matt 100g (insert). **Print:** Tryckeri City, Umeå.

Content

/ Annual
/ Report
/ 2018

Welcome to the Annual Report for 2018!

It is my pleasure to introduce the UFBI 2018 annual report. It is already May, so we are a bit later than previous years, but you know the saying “den som väntar på något gott …”.

Our productivity continues to be high, as summarized in the “In short” section. In particular, I like to highlight the fact that over 1000 research fMRI scans were completed during 2018; without reducing the clinical scan activity. The MRI crew has done a fantastic job - again!

While the majority of UFBI-related brain studies make use of various MRI sequences on the GE research scanner, and to a much smaller degree also on the 1.5 and 3T Philips scanners, more and more PET projects are conducted. The possibility to use PET-CT and PET-MRI along with advanced radiochemistry is a very unique asset that is the foundation for projects like COBRA, DYNAMIC, HYBRID, and SIMULTAN. We at UFBI are very grateful for the opportunity to year after year benefit from the strong infrastructure and the competent staff that make it possible to realize these world-class PET projects.

The report will give the readers some insight into the exciting research project that are under way at UFBI, such as unconscious working memory, the brain bases of age-related cognitive maintenance and decline, and sequential manual-task performance. Also, we showcase two UFBI-related doctoral projects that were successfully completed during 2018.

Future research activities depend largely on good ideas – but also funds to realize these. UFBI-members were again successful in 2018 in securing external research grants, and this is illustrated in the report by two projects led by Sara Pudas who won a grand-slam by securing grants from both VR and RJ in the same year.

An outstanding event during 2018 was that former UFBI PhD student Alireza Salami was appointed as a “Wallenberg Molecular Medicine Fellow”. Alireza presents some of his research plans in this report. In the context of new positions, it is also very pleasing that new PhD and postdocs continue to join us. They contribute tremendously to the success of UFBI and also to the good everyday-working climate.

When I write this Editorial, we have finished the move within “the new MBC” and I think everyone is quite happy with the new surroundings. Please come and visit us and check it out; who knows, it may be the start of a new joint research project!

Lars Nyberg, May 2018
UFBI Director (2001 - Present)

In short

In 2018 the members of UFBI produced:

18 articles

1002 fMRI-scans

26 clinical fMRI scans

68 PET-MR UFBI research scans

1283 clinical MRI scans

17 conference talks/posters

147 PET-CT UFBI research scans

2 disserations

Research

The silent side of working memory: The prioritization of relevant unconscious information

Working Memory - the cognitive function allowing the maintenance of relevant information over brief periods of time to serve goal-directed behavior – has traditionally been considered to require a conscious experience of the memorandum. However, previous findings suggested that also unconscious presented information could be maintained and affect subsequent behavior. What is more, previous behavioral research seems to indicate that unconscious information affected behavior only when it was task relevant. A the current state of the literature, little is known about the neural correlates of this task relevant prioritization during an unconscious working memory task.

Here at UFBI, several experiments has been performed during the last few years to understand how unconscious working memory relates to the standard conceptualization of working memory. An fMRI experiment conducted in 2018 was specifically focused on exploring how unconscious working memory prioritizes task relevant information and copes with task-irrelevant distractors. We used a popular paradigm (continuous flash suppression) to render stimuli non-conscious while participants performed a delayed match-to-sample task. The goal of the task was to remember the spatial location of a relevant stimulus that was always presented with a simultaneous irrelevant distractor located on the opposite side. Interestingly, both behavioral and fMRI results demonstrated an efficient discrimination between target and distractor, confirming that a prioritization of task-relevant information is also possible when the memory sample is presented non-consciously. Surprisingly, the effects depended on the

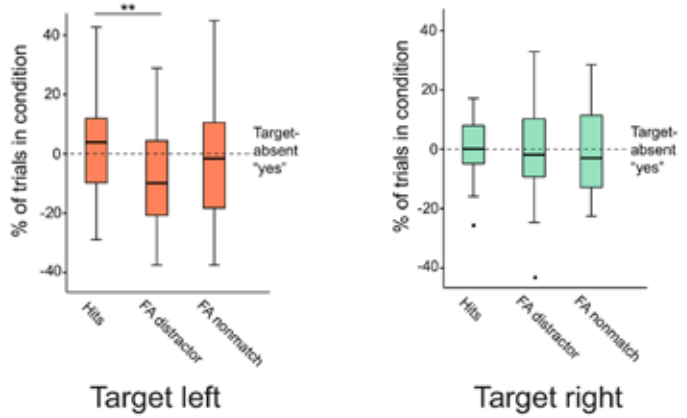


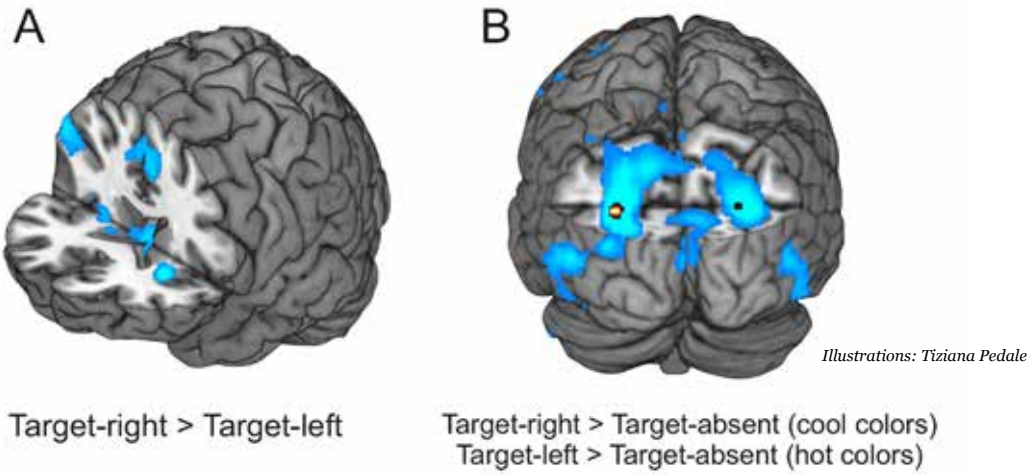
Figure 1: Behavioral data as a function of target side. The graphs show the percentage of YES responses to the probe pointing to the correct location (Hits), to the distractor (False Alarm – FA - distractor), or to an empty location (FA non match) minus the percentage of YES response in the target absent trials – trials without any unconscious stimulus - considered as a baseline. Behavioral performance was only significant when the target was on the LEFT side (hits vs. FA distractor, p = .005), an effect mainly driven by distractor avoidance.

side of the target and the behavioral and fMRI results showed opposite patterns. On one hand, performance was significantly above chance only when the target was on the left with an effect mainly driven by distractor avoidance (see Figure 1). On the other hand, the BOLD signal was large only when the target was on the right with stronger activation in the left insula, right frontal sulcus, and bilaterally in medial superior frontal gyrus (see Figure 2).

These puzzling findings convinced us to replicate the study to confirm the left/right asymmetry in target prioritization. A behavioral replication revealed again a significant above-chance performance, confirming the ability to prioritize task-relevant unconscious information. The effect was mainly driven by the target located on the left, further supporting the prioritization of information in a specific side of the visual field. Moreover, since the behavioral facilitation in the fMRI experiment was mainly driven by distractor avoidance (see Figure 1, left graph), we aim to investigate which unconscious information (location of the target or the distractor) was preferentially encoded and maintained. However, such question was difficult to clarify since target and distractor were always simultaneously presented.

Currently we are performing a second fMRI experiment in which we added a target-alone condition. Our goal is to confirm the left/right asymmetry found in the previous experiment at the brain level. Moreover we do hope that the addition of the target-alone condition will allow us to disentangle the contribution of the target and the distractor in the execution of the unconscious working memory task. Taken together the findings would be highly significant because they would connect the encoding and maintenance of unconscious information to task relevance, and by extension provide further support for the intriguing existence of unconscious working memory as such.

Tiziana Pedale



Illustrations: Tiziana Pedale

Figure 2: A) Brain responses associated with the effect of encoding target-right vs. target-left conditions during the sample presentation in the left anterior insula, right inferior frontal sulcus, and bilaterally in medial superior frontal gyrus and striatum ($p < .05$ FWE cluster corrected, CDT = .001). No significant signal change was detected for the opposite contrast (target left vs. right). **B)** Brain responses associated with the effect to encode target-right and –left trials with the target-absent baseline (cool and hot color, respectively). Strong signal change was evident in the intraparietal sulci for target-right > target-absent, but only weak signal change for target-left > target-absent.

DYNAMIC

A decade after my start at UFBI is always going to be remembered as an important year in my scientific career. I was appointed as a Wallenberg Molecular Medicine Fellow at the department of Integrative Medical Biology, the very same department that I was affiliated with for 4 years during my PhD studies. Despite the fact that I enjoyed the academic climate at UFBI, I would never had predicted that I may come back once more to Umeå given its outdoor climate (which is in sharp contrast to my preferences). However, both the position as well as the research environment were too appealing to ignore and I am delighted that I was lucky enough to be offered the Wallenberg position. The work paving the road to this position would not be possible without several good collaborators and colleagues, at Umeå University, Karolinska Institutet, and elsewhere across the globe. Thus, I would like to take this opportunity to thank all my collaborators and colleagues.

As it is well established today, cognitive impairments impede the functioning of older people and create major individual and societal costs. Developing ways to preserve functioning in old age is thus of great importance. Many attempts have been made to delay cognitive decline in aging, for example through systematic training. Such actions, if successful, would have had great consequences for individuals and for society at large. Unfortunately, however, cognitive decline in aging is still very pervasive. Thus, the ultimate goals of my research is to a) identify measurement tools that can predict future age-related cognitive decline as early as possible, before substantially irreversible damage has been caused to the brain; b) optimize effective intervention strategies that put the brakes on cognitive decline in late adulthood. As a part of this attempt, we started a large scale study, DYNAMIC, in which advanced multimodal brain mapping techniques were used to provide unique insights into neurocognitive mechanisms of healthy aging (see study design). The design of the study is planned to be longitudinal with two measurement occasions 3 years apart. We are halfway through data collection for the baseline, where 180 participants (20-80 years old) performed an extensive cognitive test battery, and underwent fMRI scanning across different cognitive states along with dopamine D1/D2 PET assessment. In addition, lifestyle descriptives were collected, and blood samples were obtained and stored for future evaluation. Thanks to the recent grant from the Wallenberg foundation, and also from the Swedish research council, a team of researchers ranging from PhD students, postdocs, and senior scienticsts are going to work on this unique dataset. I will also continue collaborating on other large-scale multi-disciplinary projects (e.g. BETULA, COBRA, UK Biobank) striving toward the ultimate goal of promoting healthy aging. Finally, I would like to extend my investigation of the brain basis of cognitive decline using the recent advent of hybrid PET/MR, a relatively new facility at Umeå university. This technique is very challenging but may foster new insights on the physiological and molecular bases underlying neural organization.

Since 2012, I have been affiliated with both Umeå University and Karolinska Institutet, thus I have been commuting a lot. This might sound a bit complicated and demanding at first glance, but I found it to be useful and inspiring to explore diverse work environments at the same time. Swapping between work places from time to time is exactly like swapping between scientific projects; it is indeed useful to put a project aside for a while once stuck and come back later with a fresh view. During my career, I have benefited from the outstretched and guiding hands of some exceptional scientists who invested immeasurable personal and professional resources into my training. Thus, in my new role as a Wallenberg Molecular Medicine Fellow, I would strive for high academic standards and building a dynamic research environment in which PhD students and postdocs could be served with sufficient support and education to foster the next generation of great scientists.

Alireza Salami

study design

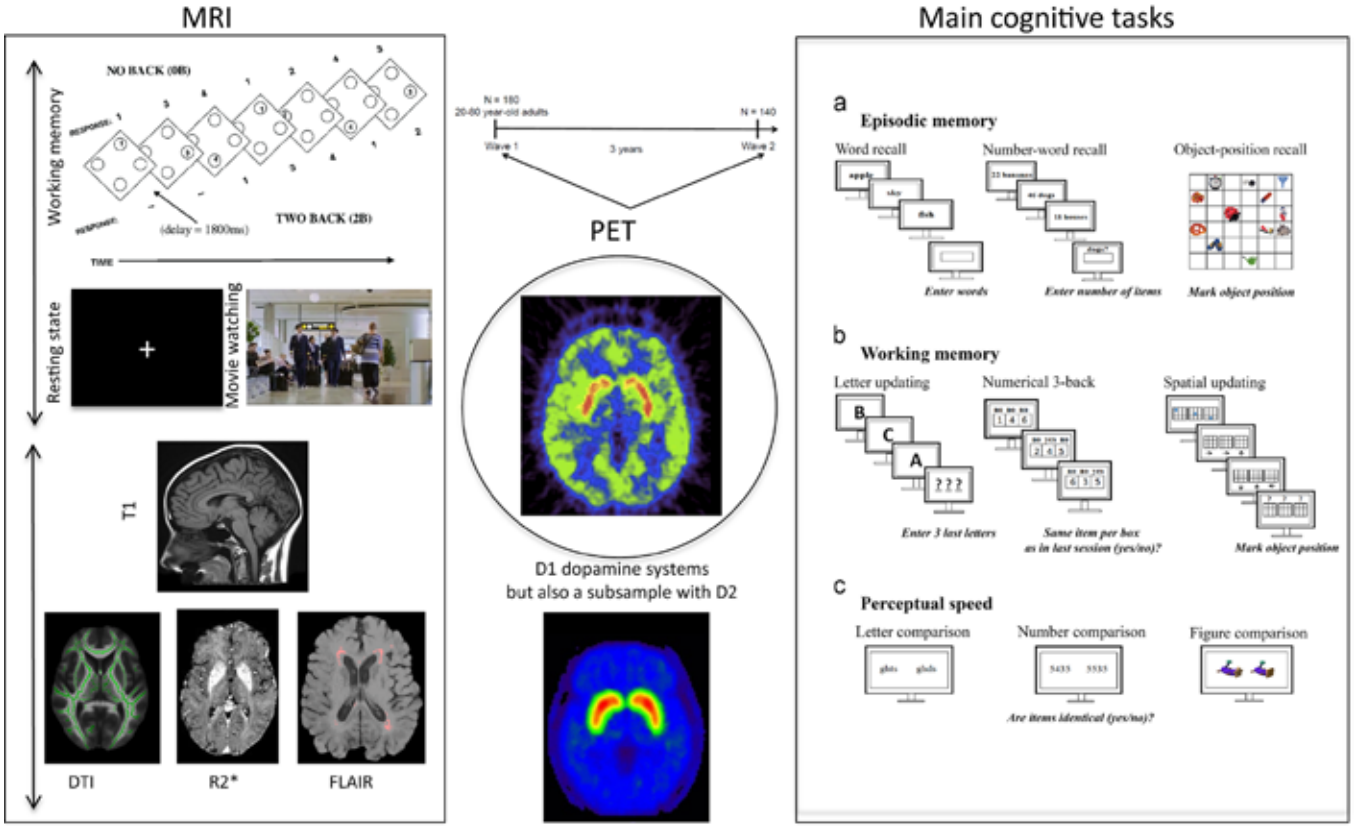


Illustration: Alireza Salami

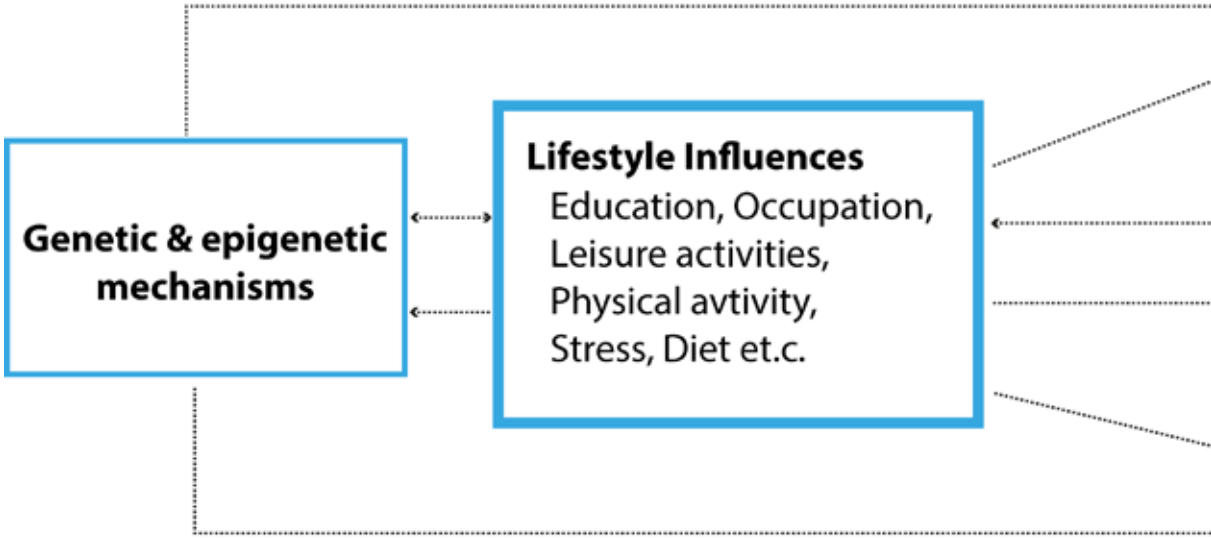
For more information on the Wallenberg Centre for Molecular science, see their webpage at:
https://www.umu.se/wallenberg-centrum-for-molekylar-medicin/forskning/

UFBI contribution to Annual Review of Psychology about successful memory aging

Nyberg, L & Pudas, S. (2018). Successful memory aging. Annual review of psychology. [*E-pub ahead of print*].

This review paper discusses successful memory aging, the fact that some individuals appear to resist typical age-related decrements in episodic memory, and proposes a model of the different paths that can lead to this desirable state. In addition to a historical review of theorizing on the concept of successful aging over the past 50 years, the paper also reviews concrete evidence, mainly from high-quality longitudinal studies, that successful aging can be demonstrated in 6-40% of individuals in the studied samples. The range in estimates reflects both differences in the criteria for success that were applied in different studies, with no currently agreed upon standard, but likely also other sample characteristics. Nevertheless, it is argued that successful aging is demonstrated in the reviewed studies both through the marked heterogeneity in memory performance in normal aging, and by some older adults performing on par with, or better than, young and middle-aged individuals. Crucial evidence also comes from longitudinal studies showing that some older adults above age 60 have stable levels of memory performance over years and even decades.

As seen in the figure below, one of the paths to successful memory aging is through brain maintenance, a relative lack of detrimental age-related changes in the brain. Evidence for this path is demonstrated by studies showing for instance maintained hippocampal volume and function, preserved cortical thickness in the cingulate cortex, and lower beta-amyloid accumulation in individuals with maintained memory functions in advanced age. The other path to preserving memory functions in aging is via compensating for arising age-related brain changes through “scaffolding” processes, such as the commonly reported increased frontal

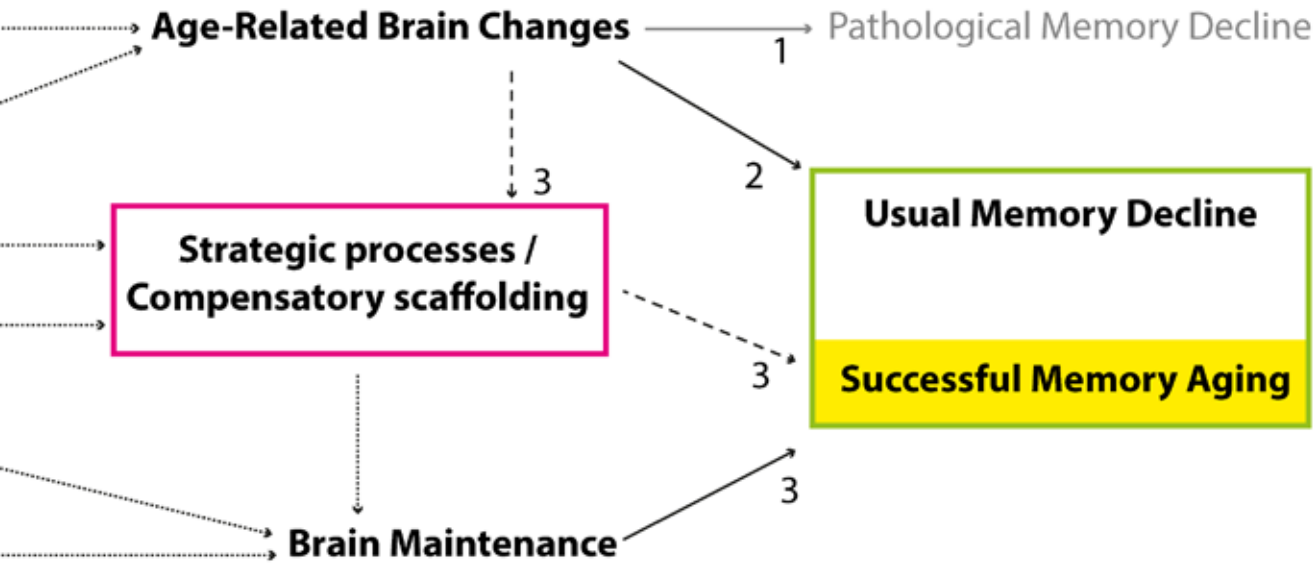


recruitment in older adults in functional neuroimaging studies. While the interpretation of increased frontal activation as compensatory is not universally agreed upon, it is still a currently dominating view and a topic of intense study. This is exemplified by a recent paper on relations among brain maintenance, cognitive reserve, and compensation[1]. The preconditions for achieving either brain maintenance or successful neural compensation can be found in both genetic factors (such as the absence of the APOE e4 allele) and lifestyle choices, most prominently higher education and intellectual stimulation by other means, higher levels of physical activity, stress reduction, and adopting a healthy diet. However, robust evidence linking many of these genetic and lifestyle factors to longitudinally preserved memory is still scarce.

The paper concludes with an outlook on whether the proportion of elderly who will meet the criteria for successful memory aging may increase in the future, both though reported improvements in memory ability across subsequent generations (i.e., Flynn-effects), and demonstrated drops in dementia incidence rates in many western countries. The possibility of influencing rates of successful memory aging through modifiable lifestyle choices and other preventive measures is also emphasized as a means to achieving beneficial effects on public health.

Lars Nyberg and
Sara Pudas

[1] Cabeza, R., Albert, M., Belleville, S., Craik, F.I.M., Duarte, A., Grady, C.L., Lindenberger, U., Nyberg, L., Park, D.C., Reuter-Lorenz, P.A., Rugg, M.D., Steffener, J., Rajah, N.M. (2018). Maintenance, reserve and compensation: the cognitive neuroscience of healthy ageing. Nature Reviews Neuroscience, 19(12), 701-710.



Zooming In

Säfström, D. and Domellöf, E (2018) Brain activations supporting linking of action phases in a sequential manual task. NeuroImage 172: 608-619.

Most everyday manual tasks are comprised of a sequence of action phases, where each action phase has a goal representing a task subgoal. Subgoal achievement is generally associated with discrete multimodal sensory events. For example, when drinking coffee, the lifting and the subsequent replacing of the cup on the table are associated with discrete tactile, visual and auditory signals which mark the completion of the loading and replace action phases.

An important aspect of sequential manual tasks is to achieve efficient transitions, or linking, between action phases. This is achieved using a predictive control policy where motor commands for the next phase are specified and released in anticipation of sensory confirmation of goal completion of the current phase. As such, predictive linking enables fast and smooth phase transitions that substantially decrease the time required to complete the overall task. In contrast, phase transitions would be slow and stuttering because of neuromuscular delays if peripheral afferent information about goal completions reactively triggered the execution of the next phase. Moreover, an important feature of predictive control is comparisons between predicted and actual sensory feedback about subgoal completions, in order to detect errors during task progression. If sensory confirmation of goal completion of an action phase is absent, or if there is a discrepancy between predicted and actual

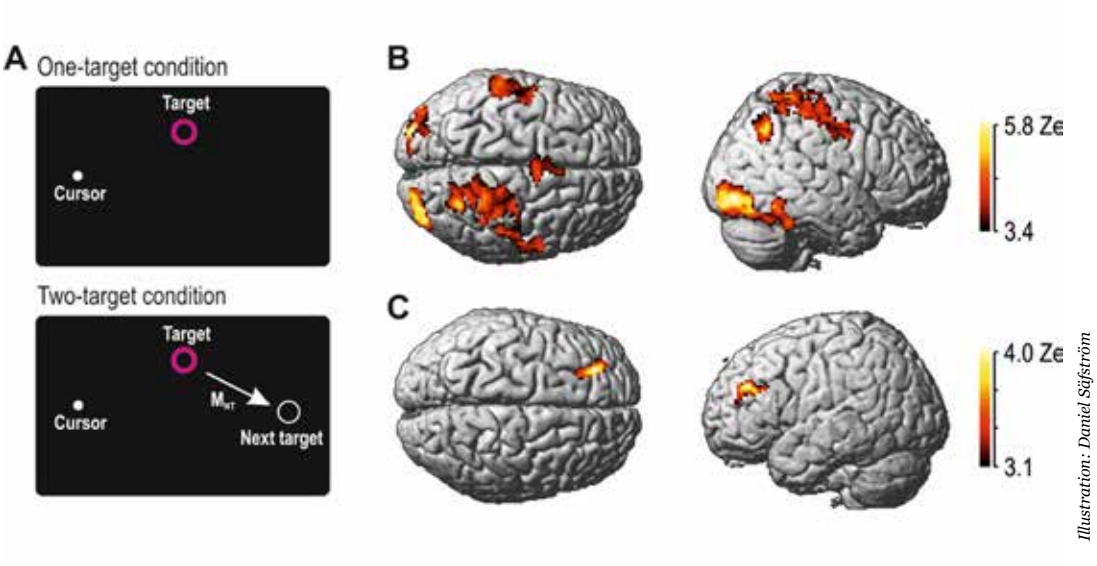


Illustration: Daniel Säfström

Figure 1. A: Experimental conditions with one target or two targets visible on the screen. The movement vector towards the next target (MNT) could only be specified in advance when the next target was visible on the screen. **B:** Increased activations during predictive linking of action phases. **C:** Increased activations during corrective actions.

feedback, the sensorimotor system typically responds with corrective actions to complete the current action phase before proceeding to the next.

The aim of the present study was to investigate the brain activations supporting such predictive linking and corrective actions in manual tasks. During MRI-scanning, sixteen participants (5 males, 11 females; mean age 27.3 years) performed a sequential manual task, where they steered a cursor on a computer screen towards sequentially presented targets, using a hand-held manipulandum. The task was to complete each consecutive target by holding the cursor within the target zone for a required duration, before moving to the next target. One condition that enabled predictive linking, by presenting forthcoming targets on the screen such that motor commands for upcoming movements could be specified and initiated in advance ('two-target condition'), was compared with another condition where no such linking was possible ('one-target condition'; Fig. 1A). We also compared trials where targets were completed successfully with erroneous trials that required corrective actions.

We found that predictive linking was associated with increased activation in right-sided fronto-parietal areas known to be involved in visuospatial attention, eye movements and motor planning (Fig. 1B), presumably related to processing of the next target location and the desired movement vector. We also observed increased activation in left-sided parietal areas related to shifts of motor attention, which is particularly important in sequential motor tasks when the focus of attention quickly must be shifted from one movement in a sequence to the next. Finally, we observed increased activation in occipital regions bilaterally reflecting visual processing, and in the anterior midcingulate cortex reflecting continuous performance monitoring.

Corrective actions were associated with increased activation in the left dorsolateral prefrontal cortex (DLPFC; Fig. 1C). The DLPFC has a critical function in executive control, that is, in controlling overt, intentional, nonautomatic behavior. Provided that task progression between targets normally was quick, fluent and automatized, the increased activation in DLPFC may represent that the participants reestablished overt executive control over the task.

Given the vast number of sequential manual tasks we typically perform each day, understanding the brain organization and control operations related to efficient phase transitions is of basic scientific importance. However, it is also important for understanding the symptoms of hand injuries, stroke and neurological disease, since these conditions often impair manual skills. In particular, such knowledge will be important for designing more effective tools for assessing the loss of manual skills and for devising effective therapies for rehabilitation. Knowledge within the area of sensorimotor control may also function as an inspiration source for developing new principles within robotics, 'man-machine' interactions and hand prosthetics.

Daniel Säfström and Erik Domellöf

Dissertations

Active workstations: a NEAT* way to prevent and treat overweight and obesity?

In my thesis, we investigated the long-term effects on physical activity and sedentary behavior of installing treadmill workstations in offices. Further, we wanted to investigate if this had any effect on different body and metabolic measurements, on brain volume and structure, and on cognitive functions, measured with a cognitive test battery. The study was a randomized controlled trial, with a 13 months study period.

A lot of nervousness preceded the big day when it was time to defend the thesis. However, I somehow managed to follow the advice that so many have given me throughout the years a PhD-student: to enjoy the day of the defense, as it is a once in a lifetime experience. This was very much due to the excellent opponent, professor Mats Börjesson from the University of Gothenburg, who really managed to capture the important things in the thesis and open up for a nice discussion with interesting and tricky questions.

The last few years have been an exciting journey, getting the opportunity to work as a PhD-student within such a broad and interesting project, and I have truly enjoyed the time working in the project. During the coming months, I will continue with analyses of fMRI-data that we have collected in the study. Many new hypotheses were generated from the results in my thesis, which I hope to be able to test in future research.

Frida Bergman

** Non-Exercise Activity Thermogenesis*

Photo: Mikael Stiernstedt

Blood flow assessment in cerebral arteries with 4D flow magnetic resonance imaging.

In the spring of 2013, when I approached the end of my master studies in biomedical engineering and started to think about the future, I found an ad in the newspaper that caught my attention. A few months later I packed up my things and moved from Gothenburg to Umeå to start my new career as a PhD student, working with 4D flow MRI and cerebral blood flow.

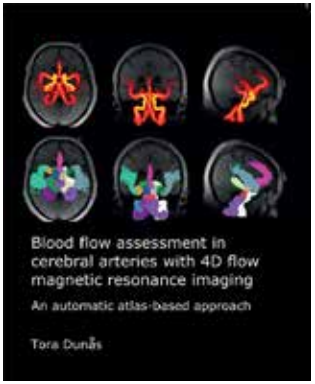
The aim of my PhD-project was to develop new tools for automatic analysis of 4D flow MRI, locating arteries and calculating their blood flow rate based on velocity measurements, for applications in things like stroke care and research on cerebral hemodynamics. Through my supervisors Anders Eklund, Anders Wåhlin and Jan Malm, I soon got in contact with UFBI, and my interest for cognition and functional imaging began to grow.

Almost five years later, it was time to defend my thesis, and Umeå celebrated with nothing but beaming sunshine all spring, while I was stuck in my office, writing to the sound of hospital reconstructions. It might be a cliché, but the defense itself went by faster than I could ever imagine, and it was a true joy to discuss my research with my opponent Einar Heiberg from Lund University.

When it was time to start apply for post-doc positions, I decided to aim towards cognitive neuroscience, and was lucky enough to get a position with CJ Boraxbekk, working on one of my main research interests - the aging brain. This means that I will stay in Umeå and continue working with UFBI for a few more years, using machine learning and multimodal imaging to make predictions about brain aging, very exciting!

Tora Dunås

Photo: Mikael Stiernstedt



Grants received during 2018

Longitudinal evaluation of telomere length and DNA-methylation patterns in neurocognitive aging and dementia

This ongoing project, now funded by a 4-year grant from the Swedish Science Council, investigates whether two age-sensitive cellular mechanisms implicated in biological aging; telomere length (TL) and DNA-methylation (DNAm), act as biomarkers or potential biological mechanisms behind individual differences in neurocognitive aging and dementia. Briefly, telomeres are protective end-caps at the ends of chromosomes, which shorten with each cell division and in response for instance to oxidative stress, and are therefore considered correlates of biological age. DNAm is an epigenetic process in which methyl groups are added to certain sites of the DNA, thereby modifying DNA activity and regulating gene expression, without changing the DNA sequence itself. DNAm profiles have been used to accurately predict chronological age on the group level, but also to assess the epigenetic age (DNAm age) of individuals. Thus, both measures are thought to capture accelerated or decelerated biological aging beyond an individual's chronological (i.e., calendar) age.

The project will be conducted with data from the Betula study, which comprises up to 25-year follow-ups of almost 2000 well-characterized individuals with data on genotypes, cognition, health, and lifestyle. Across several planned sub-studies we intend to investigate for instance; whether TL and DNAm measures are interrelated across time, if a combination of TL and DNAm differentiates individuals with Alzheimer's disease from matched controls, whether longitudinal TL changes are associated with cognitive changes over a 20-year period, and if longitudinal changes in TL predict 4-year volumetric brain changes previously linked to cognitive aging.

We hope that the project will contribute knowledge to aid early identification of individuals at risk for adverse neurocognitive aging outcomes, as well as to guide the search for interventions for delaying or preventing such conditions.

Sara Pudas and the research team consisting of Rolf Adolfsson, Sofie Degerman, Maria Josefsson, Magnus Hultdin, Annelie Nordin Adolfsson, Mattias Landfors, Karolina Kauppi, and Lars Nyberg.

Schematic overview of the project and types of available data that can be used to clarify the complex and interacting mechanisms behind neurocognitive aging and dementia. Here illustrated with telomere shortening as a potential mediating mechanism.

Changes in memory processing across adulthood – development rather than decline?

This 3-year project, financed by Riksbankens Jubileumsfond, will try to identify potential adaptive and beneficial changes in declarative memory processing or representations from young to middle adulthood. According to one of the hypotheses, healthy middle-aged adults may use more integrative memory processing as an adaptation to handle the increased interference caused by storing an ever growing number of memory traces across the lifespan. Memory integration is a process by which related memory traces are hypothesized to become linked through allocation to overlapping neural populations, and is sometimes thought to be in trade-off with memory discrimination, the process though which a memory trace's unique details are recovered. These two processes, among others, will be studied in the current project. To assess the degree of integration or separation of related memory traces in young and middle-aged adults, and how these measures support successful memory performance, both comprehensive behavioral memory assessment and representational similarity analyses of fMRI-data will be employed. One aim of the project is to try to determine whether some previously demonstrated decrements in mnemonic discrimination ability in middle age are in fact the result of an adaptive shift to more integrative memory processing, rather than being early signs of age-related neurocognitive decline. Thus, the project has the potential to demonstrate adaptive plasticity in the balance between two sub-processes of declarative memory, across the human lifespan. In addition, the contributions of the project will be not only to shed light on an understudied portion of the human lifespan, midlife, but also to provide a better backdrop for the age-related cognitive declines that occur in more advanced age.

Sara Pudas

Meetings and seminars

A multidisciplinary research environment, a multi-faceted research agenda, and a growing research group make structured interaction platforms indispensable. To this end we have monthly lab meetings where project plans, experimental designs, analysis strategies, and results are discussed in an informal setting to benefit from the whole brain trust of UFBI. In addition to these meetings we have an annual UFBI lab day, this year held on June 15, were our members gave presentations on their different projects with subjects spanning from neurosurgical use of fMRI to long-lasting effects of preterm birth, just to mention a few. We also had the pleasure of having Avinash Kumar Singh as a guest speaker, who talked about deep learning and its applications.

In November, the Cognitive Science Program at Umeå University celebrated 20 years since its start with a day of seminars with presentations from previous students, researchers and other cognitive scientists active in different parts of the field around Sweden.

Besides in-house meetings, members of UFBI usually attend several meetings and conferences each year held in, and outside Sweden. A list of attended conferences and given talks is shown on page 22.

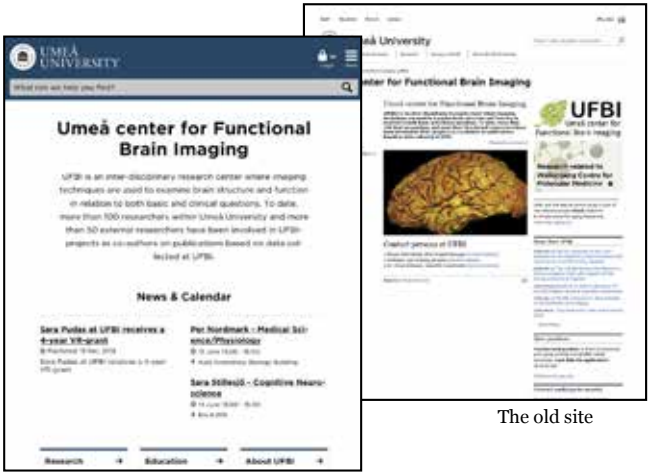
Photos: Jenny Nilsson

Linnea Karlsson Wirebring (left) and Johan Eriksson (right) at the Cognitive Science day at Umeå Unversity.

UFBI web and media

During 2018, the process of cleaning, moving and renewing the Umeå University web was launched. The old site that was based on InfoGlue needed to be replaced to meet the modern standards and compatibility. The old site also contained thousands of different pages on several different websites which made it difficult to get an overview. During the work on the new umu.se, now on EPiServer, the number of pages was greatly reduced and is now a system more based on tagging content and using blocks to handle, select and show content in a more uniform way. The site is now split up in areas for external visitors, students, and co-workers (on the Aurora-platform).

As a result of this work, UFBI got a new adress: www.umu.se/ufbi



The new www.umu.se/ufbi

The old site

In March we were visited by a film crew sent from Wallenbergsstiftelserna to do a segment on the research done here in Umeå and at UFBI. The visit resulted in a movie that in part presents UFBI-related work, in particular Lars Nyberg's work on the aging brain and risk for developing dementia. The movie is aimed for the general public and for educational purposes and can be viewed at the official channel of Wallenbergstiftelserna on YouTube. Besides this movie, UFBI figured in the general media as showed in the list below.

Screenshot: Wallenbergstiftelserna

M Magasin, "Så förändras ditt minne med åldern", article with Lars Nyberg, issue 16 2018.

Wallenbergstiftelserna, "De vill bota ALS, Alzheimer och andra demenssjukdomar".

DN Insidan, "Så tränar du upp ditt minne - sju enkla metoder": https://www.dn.se/insidan/sa-tranar-du-upp-ditt-minne-sju-enkla-metoder/, 2018-09-18

SR P4 Västernorrland, "Varför kommer vi ihåg saker som inte är viktiga längre?", 2018-02-08.

Västerbottens Kuriren, article on Lars Nybergs at Fika efter en Forskare, 2018-01-24.

Article on Lars Nybergs presentation in Kyoto, Japan, 2018-01-09.

Publications

The list below is focused on journal articles, book chapters, doctoral theses and conference presentations that were based on structural/ functional MRI data and/or PET data collected within UFBI. In addition, other relevant work produced by UFBI members is listed.

Original articles

Berginström, N., Nordström, P., Ekman, U., Eriksson, J., Nyberg, L., & Nordström, A. (2018). Pharmaco-fMRI in Patients With Traumatic Brain Injury. Journal of Head Trauma Rehabilitation. [*E-pub ahead of print*]. DOI: https://doi.org/10.1097/HTR.0000000000000440

Bergström, F., & Eriksson, J. (2018). Neural evidence for non-conscious working memory. Cerebral Cortex, 28, 3217-3228. DOI: https://doi.org/10.1093/cercor/bhx193

Davies, G., Lam, M., Harris, S. E., Trampush, J. W., Luciano, M., Hill, W. D., ... Deary, I. J. (2018). Study of 300,486 individuals identifies 148 independent genetic loci influencing general cognitive function. Nature Communications, 9(1), 2098. DOI: http://doi.org/10.1038/s41467-018-04362-x

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Review articles / Book chapters

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Dissertations

Bergman, F. (2018). Active workstations: a NEAT way to prevent and treat overweight and obesity? Doctoral dissertation, Umeå University [*contains data from UFBI*].

Dunås, T. (2018). Blood flow assessment in cerebral arteries with 4D flow magnetic resonance imaging. An automated atlas-based approach. Doctoral dissertation, Umeå University [*contains data from UFBI*].

Select conference presentations

Nyberg, L. (2018, December). Pattern-completion deficits in aging: bound to happen? Invited presentation, LCBC seminar, Oslo University, Norway.

Nyberg, L. (2018, November). Memory aging and brain maintenance. Invited presentation, Danish Research Center for Magnetic Resonance (DRCMR), Copenhagen University Hospital Hvidovre, Denmark.

Nyberg, L. (2018, October). Avbilda hjärnans funktioner; exempel från studier av smärta. Invited presentation, Swedish Pain Society, Smärtforum, Umeå.

Nyberg, L. (2018, October). Generaliserbarhet och replikerbarhet inom hjärnavbildningsfältet. Invited presentation in symposium on; ”Uppreparhet – generaliserbarhet i vetenskapen”. The Royal Society of Arts and Sciences in Gothenburg.

Stillesjö, S. (October 12, 2018). Dynamic changes in precuneus activity during exemplar-based learning: support for a declarative account. Talk presented at 14th SweCog national conference, Linköping, Sweden.

Nyberg, L. (2018, September). Memory aging and brain maintenance. Invited talk at “Bordeaux Neurocampus Conference on; “Aging of memory functions: where are we?” Bordeaux, France.

Nyberg, L. (2018, August). The many facets of plasticity. Presentation in symposium at “The 13th Nordic Meeting in Neuropsychology” Stockholm.

Eriksson, J., Pedale, T., Fontan, A., Grill, F., & Bergström, F. (June 27, 2018). Distractor avoidance in a non-conscious working-memory task. Poster presented at the 22nd annual meeting for the Association for the Scientific Study of Consciousness, Krakow, Poland.

Nyberg, L. (2018, May). Functional MRI. Invited talk at “Symposium on Head trauma in sports and risk for dementia”, Nobel Forum, Stockholm.

Nyberg, L. & Lindenberger, U. (2018, May). Brain maintenance. Talk at symposium on “Cognition and the Aging Brain: Maintenance, Reserve and Compensation, “Cognitive Aging Conference, Atlanta, USA.

Pudas, S. (May 4, 2018). Generational effects for school performance and education attainment as early-life predictors of age-related memory decline. Talk presented at the Cognitive aging conference, Atlanta, USA.

Jakobson Mo, S., Axelsson, J., Larsson, A., Jonasson, L., Ögren, M., Varrone, A, af Bjerkén, S., Linder, J. & Riklund, K. (April 20-24, 2018). Dopamine Transporter imaging with [18F] FE-PE2I PET versus DaTSCAN SPECT— a clinical comparison. Presentation at 12th World Congress of the World Federation of Nuclear Medicine and Biology (WFNMB 2018), Melbourne, Australia.

Nyberg, L. (April 18-22, 2018). New perspectives on episodic memory decline - from aging to neurodegeneration. Talk presented at The international conference on Learning and memory, Huntington Beach, California, USA.

Pudas, S. & Rönnlund, M. (April 18-22, 2018). Age predictors of age-related memory decline. Poster presented at The international conference on Learning and memory, Huntington Beach, California, USA.

Salami, A., Wåhlin, A., Garret, D., Papenberg, G., Rieckmann, A., Karalija, N., Andersson, M., Axelsson, J., Riklund, K., Lövdén, M., Lindenberger, U., Bäckman, L. & Nyberg, L. (April 18-22, 2018). Dopamine D2 is associated with neural responses during working memory in a load-dependent manner. Poster presented at The international conference on Learning and memory, Huntington Beach, California, USA.

Domellöf, ME., Norrbom Dahlén, H., Forsgren, L., Nyberg L, Bäckström, D., Boraxbekk, CJ. & Stigsdotter Neely, A. (March 2018). Cognitive training in Parkinson’s disease, Poster presented at the AAT-AD/PD focus meeting 2018, Turin, Italy.

Nyberg, L. (2018, March). Aging brain, aging mind. Presentation at symposium on Hemispheric Asymmetry and beyond, Bergen University, Norway.

Select science presentations --->

Select science presentations

Eriksson, J. (November 15, 2018). Functional brain imaging of conscious and unconscious processes. Presentation at Umeå Cognitive Science Day, Umeå, Sweden.

Grill, F. (November 15, 2018). Data Blitz presentation at Umeå Cognitive Science Day, Umeå, Sweden.

Stillesjö, S., Nyberg, L. & Karlsson-Wirebring, L. (November 15, 2018). Exemplar-based judgments are mirrored by brain activation in the precuneus. Poster presented at Umeå Cognitive Science Day, Umeå, Sweden.

Jonasson, L (May 21, 2018). Fysisk aktivitet och hjärnan. Presentation at Sveriges Neuropsykologers förening, Umeå, Sweden.

Nyberg, L. (May 15, 2018). Hjärnans plasticitet. Presentation at Sveriges Neuropsykologers förening, Lund, Sweden.

Nyberg, L. (February 15, 2018). Brain-centered research collaborations: experiences from UFBI. Presentation given at Faculty of Medicine 2nd Open Research Meeting, Umeå University, Sweden.

Nyberg, L. (January 27, 2018). Det åldrande minnet, presentation at Fika efter en Forskare, Väven, Umeå, Sweden.

Nyberg, L. (January 9, 2018). Challenges of neuroscience in the era of global super-aging. Presentation at Kyoto University's Higashi Ichijikan, Japan.

This Annual Report shows only a part of the activities happening at UFBI, for a more complete picture you can visit

www.umu.se/ufbi

and read previous years' reports as well as summaries of current projects.

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