

LEIDEN INSTITUTE FOR BRAIN AND COGNITION

ANNUAL REPORT 2010



Universiteit Leiden



LEIDS UNIVERSITAIR MEDISCH CENTRUM

Preface

The past year has been very active and fruitful for the Leiden Institute for Brain and Cognition (LIBC). The LIBC experienced an increase in the number of activities and the number of affiliated researchers, not only from research groups already involved in the LIBC, but also from new groups within Leiden University, interested in studying brain and cognition from an interdisciplinary perspective. The introduction of the LIBC research themes 'Junior', 'Language', 'Pharma' and 'Stress', and the developments within the university profile area 'Brain function and dysfunction over the life span' have certainly contributed to this growth.

LIBC members have access to a variety of high-tech equipments such as MRI scanners, state-of-the-art EEG labs, psychophysiology labs, baby labs and phonetic labs. Due to the exponentially increased use of 3T MRI brain scanning, the Executive Board of Leiden University in 2009 decided to purchase another 3T MRI scanner, dedicated to LIBC research. This scanner was placed in the LUMC in 2010 and, after a short calibration period, swiftly taken into use early 2011.

Following the success of the first LIBC symposium accessible to the general public, the LIBC has decided to organize at least one public symposium each year. In 2010, the LIBC organized the public symposium 'Sleepless in Leiden', with lectures from national and international researchers on various aspects of sleep, including disturbances of the biological clock, sleep and memory, and lucid dreaming.

The LIBC and the Leiden Center for Translational Neuroscience (LCTN) are cornerstones of the university profile area 'Brain function and dysfunction over the lifespan', which was granted financial support from the University to further develop interdisciplinary brain research activities. In 2010, development of the website of the profile area was initiated and the starting grants were introduced. The starting grants aim to fund innovative, interdisciplinary, high-risk, startup projects on topics that fit in the profile area. It is expected that these startup projects will serve as starting points for future grant applications. A first call for startup proposals was launched in September 2010 and received an enormous response, as reflected by the great number of high-quality proposals submitted.

The LIBC continued its active participation in training and education. The interdisciplinary minor 'Brain and Cognition' and the fMRI analysis course were again well attended, and we started to prepare a roadmap towards an interdisciplinary master 'Brain and Cognition'.

As in previous years, we present in this annual report a selection of research projects from various LIBC disciplines, as well as eight selected highlights. This report also includes a list of facts and figures about the LIBC and its activities. We hope you will enjoy reading this report. For more information about the LIBC, please visit www.libc-leiden.nl.

LIBC Management Team, May 2011.

Focus of attention on landscape of reading



Prof. Paul van den Broek

What happens in your brain while you are reading this report? As you progress through the text, a landscape of activations and processes unfolds. Educational psychologist Professor Paul van den Broek has received funding to chart the cognitive and neurological processes involved in text comprehension in children and adults.

In 2010, Van den Broek was invited by the American National Academy of Sciences to be Expert Adviser for a congressional committee formulating research and funding priorities about how people learn from texts. In this context, he was also invited to summarise his research on cognitive and neurological processes and knowledge representation in the prestigious journal *Science*. How do readers extract information from a text? According to Van den Broek and colleagues, the key to comprehending a text is the construction of a coherent mental representation that integrates textual information and relevant background knowledge. The processes by which readers identify relations, or fail to do so, are captured in a computer simulation. 'This psychological model conceptualises the reading process as a balancing act between the reader's limited attention or working memory and the need for coherence,' he explains. 'At any point during reading, one can only attend to a subset of all the elements in a text or in one's relevant background knowledge. As the reader proceeds through a text, the contents of his or her working memory are continually refreshed as a function of automatic and intentional processes, with some elements remaining in the focus of attention while others are replaced by new ones. Through binding, these fluctuations in the activation of text and background knowledge elements during the course of reading gradually result in the emergence of a representation. Thus, good reading requires the effective allocation of these limited attentional resources.'

After working at research universities in the USA for 28 years, Van den Broek moved back to his birthplace, Leiden, where since 2008 he has held the position of Professor in Cognitive and Neurobiological Foundations of Learning and Teaching. He remains affiliated with the University of Minnesota, where he recently completed a 2.5 million dollar project. He has applied for a further US grant to continue this line of research, including at Leiden University. In 2010, he received a 220,000 euro NWO Brain & Cognition grant from The Netherlands Organisation for Scientific Research to elucidate which brain regions and

February 8

On this Dies Natalis of the University, Professor Antonio Damasio (University of Southern California), famous for his popular books on the biological nature of consciousness (*Descartes' Error – Emotion, Reason and the Human Brain*, *The Feeling of What Happens*, *Looking for Spinoza – Joy, Sorrow and the Feeling Brain*), receives an Honorary Doctorate and gives an interactive presentation entitled 'Thinking about Brain and Mind'.

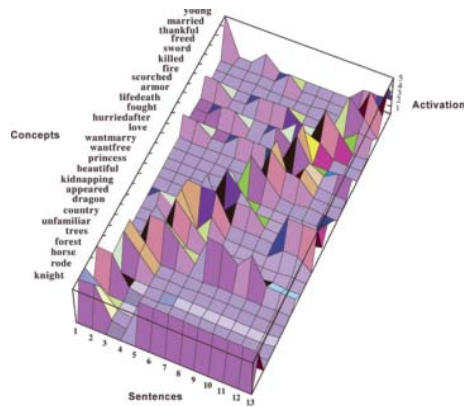


cognitive processes are activated during text comprehension. This research is being conducted with new Assistant Professor, Dr Linda van Leijenhorst, a specialist in neurocognitive development, and PhD candidate Anne Helder (both of whom are also LIBC members). In this project, the team will measure reaction times, reading speed, eye movements, and combinations of EEG and fMRI signals in children who are proficient readers as well as in children who struggle. By using tightly constrained texts, the team are able to isolate particular processes.

‘We noticed that children in one subgroup of poorly comprehending readers hardly jump back in the text or use background knowledge. They simply restrict their processing to comprehending each sentence in isolation. A second group of weak readers *do* jump back or access their background knowledge, but they do so inefficiently or ineffectively. These subgroups reappear in study after study. Whereas this particular project is focused on understanding the development of text comprehension, others are aimed at developing techniques to improve comprehension skills in the different subgroups and at translating these techniques into interventions that can be easily implemented in classrooms.’

A final project concerns further development of the computational model. In the current version of the Landscape model the multidimensional space of background knowledge that readers bring to bear on reading plays a minor role. Together with Dr Meni Yeari, a postdoctoral fellow from Israel, Professor van den Broek has received a 150,000 euro European Marie Curie grant to expand the model. In this project, Dr Yeari uses artificial-intelligence network approaches to capture this knowledge and to incorporate it into the landscape model.

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Van den Broek, P.W. Using texts in science education: cognitive processes and knowledge representation. Science 2010; 328: 453-6

February 15

The symposium on ‘Educational Neuroscience’ is the official start of LIBC junior, a Leiden network of seven research groups that study both normal and pathological child and adolescent brain development and behaviour. The symposium includes lectures on language and reading. The special guest is Professor Usha Goswami (University of Cambridge), an expert on neurocognitive aspects of reading and dyslexia.



Parenting in the genes: for better and for worse



Prof. Marian Bakermans-Kranenburg

‘Difficult children might be like orchids withering away in bad environments but fully flourishing in nurturing environments,’ comments Professor Marian Bakermans-Kranenburg from the department of Child and Family Studies. She received a prestigious Vici award for her research proposal *Made-to-measure parenting support*.

‘Not everyone is equally susceptible to such environmental influences as negative life events or rearing effect. Temperamental and genetic factors seem to be risk factors but may actually be susceptibility factors to the effects of the environment in general. Adverse contexts are supposed to create very negative child outcomes, supportive contexts may promote exceptionally positive outcomes.’ According to behavioural scientist Bakermans-Kranenburg, this new *theory of differential susceptibility* radically deviates from established models of cumulative risks. ‘We should not talk about “risk” alleles or “difficult” temperament but be open to the possibility that these factors also create opportunities for optimal development in excellent environments.’

The Leiden research group of Professor Marinus van IJzendoorn and Bakermans-Kranenburg at the Center for Child and Family Studies was the first to discover the potential role of genes as susceptibility factors. The team concentrated on the dopamine D4 receptor (DRD4) gene. The dopaminergic system is engaged in attentional, motivational and reward mechanisms. Of special interest is the exon III DRD4-7repeat allele, which shows lower dopamine reception efficiency. Carriers of this DRD4-7R allele are found to be at risk for several forms of externalizing problems across the life span, such as aggression, attention deficit hyperactivity disorder (ADHD) and sensation-seeking.

Bakermans-Kranenburg: ‘Most research conceptualizes DRD4 as a “risk gene” and carriers of the DRD4-7R allele as “vulnerable individuals”. But our findings actually reflect heightened susceptibility of these carriers to the effects of the rearing environment in general, for better *and* for worse. For example, we found that children with the DRD4-7R allele showed high levels of externalizing behaviour problems and disorganized attachment under conditions of environmental risk, but also remarkably positive outcomes

March 18

At the second LIBC symposium ‘Sleepless in Leiden’ Professor Joke Meijer (Neurophysiology) explains the biological clock, Professor Tracey Kahan (Santa Clara University) explores lucid dreaming, Professor Eus van Someren (VU Amsterdam) addresses old age, dementia and insomnia, and Professor Jan Born (University of Lübeck) asserts that learning during sleep is not a dream. Leader of the debate Professor Bernhard Hommel (Cognitive Psychology) concludes with ‘thoughts from a sceptic’.



when they received supportive care. Also, parents may be differentially susceptible to the environment, depending on their genotype or temperament.

In one of the new studies on differential susceptibility, Bakermans-Kranenburg and her colleagues will make use of an Infant Simulator to test differential susceptibility of adults in their role as caregivers. The Infant Simulator (Realityworks, Inc) is a very realistic doll representing a baby that experiences hunger, needs a diaper, and produces crying sounds to show its distress – progressing from fussing to intense crying. The baby doll needs sensitive care in order to be soothed. It has a lifelike neck that falls back if not supported and makes lifelike infant breathing sounds when “asleep”. Participants’ heart rate, skin conductance levels and hormonal stress reactions will be monitored while they are taking care of the doll. The differential susceptibility hypothesis is that caretakers with DRD4-7R and other dopamine-system related genes leading to a less efficient dopaminergic system will be most insensitive in their interactions with the doll when they experience unrelated stressful events (e.g. stress caused by an exam), whereas they will do a better job of parenting the doll when they can concentrate fully on the task at hand, without other stressors. ‘The realistic baby doll is a perfect model for the challenge of child rearing. We can schedule the doll’s behaviour in any way we want. I expect this paradigm to become very popular in research, and in the future maybe also as parent training tool.

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May 15

As part of the celebration of the 87th lustrum of Leiden University, one of the LIBC hotspots, the LIBC Junior, organises a public symposium ('Kinderkopjes in Leiden') at the Kamerlingh Onnes Building in the old town centre - where the cobblestones that form the pavement vaguely resemble baby heads ('kinderkopjes'). In three plenary lectures and thirteen workshops, participants are taken on a tour of the brain's development, from birth to adolescence.

From May 16, a summary is shown on nos.nl/artikel/157663-eeen-kijkje-in-het-puberbrein.html.



Functional connectivity and stress



Ilya Veer

The key to proper brain functioning lies in the interactions between the different components of the brain. Ilya Veer uses fMRI to study these functional connections in relation to stress. What happens when brains are stressed? How are connections affected by stressful situations? What is wrong in brains of people with depression or suffering from post-traumatic stress disorder?

This year, Ilya Veer will conclude his PhD thesis on subtle changes in functional connectivity between brain regions after stress and in stress-related psychiatric disorders. Veer studied psychology at the University of Amsterdam, where he specialized in clinical neuropsychology and psychophysiology. In 2005 he joined the research group of Professor Serge Rombouts, a pioneer in the field of *resting state* fMRI (RS-fMRI, a technique especially suitable for studying functional connectivity in the brain). Veer's project is a perfect example of collaborative research within the LIBC. He studied major depression with Dr Nic van der Wee and PhD student Marie-José van Tol (Department of Psychiatry), while his research on healthy stress and post-traumatic stress disorder (PTSD) was carried out in collaboration with Dr Nicole Oei and Dr Bernet Elzinga (Clinical, Health and Neuropsychology Unit). 'Depression and PTSD are stress-related disorders that involve deficits in both the cognitive and emotional domain,' Veer explains. 'Can we link a specific connectivity profile to this type of disorder that might explain its symptoms? Does stress alter functional connectivity in healthy participants to create the patterns observed in disease states?'

Exploring multiple resting state networks (RSNs) that together comprise the entire brain was a new approach in depression research. Comparing medication-free patients recently diagnosed with major depression with age- and gender-matched controls, he discovered that depression could be characterized by decreased functional connectivity in three RSNs: a ventral affective network, a dorsal network associated with attention and working memory, and a network comprising the medial visual cortex. Veer: 'Our results corroborate previous findings on both the affective and cognitive abnormalities typically found in depression, but now we can put these in the context of network dysfunction.'

Veer also focused on how the brains of PTSD patients respond to irrelevant emotionally negative images during a cognitive task. 'PTSD patients have experienced acute and severe exposure to stress, which is

July 15

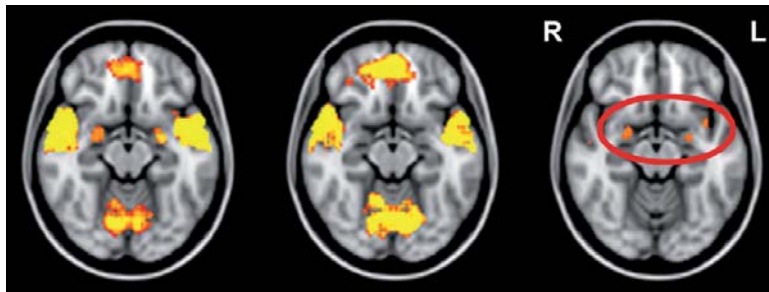
Dr Berna Güroğlu of the Brain and Development Lab has received a € 250,000 Veni grant from the Netherlands Organisation for Scientific Research (NWO) for her study entitled 'The social brain in adolescence: Examining peer interactions from a developmental social neuroscience perspective'. Within this research she will examine adolescents' social interactions with their classmates using various economic exchange paradigms and brain imaging techniques to investigate the development of the neural mechanisms underlying social interactions and their links with psychosocial adjustment.



thought to render the brain more sensitive to emotional intrusions. The results obtained in our study indeed show that the brain, particularly the amygdala, is significantly more perturbed by such images in patients.' In another study, Veer and his collaborators demonstrated that a similar effect can be observed when healthy male participants are subjected to a mildly stressful situation. 'Using the Trier Social Stress Test (TSST), in which participants have to give a five-minute presentation in front of a committee, we were able to replicate the effects found in PTSD patients. This suggests that the brain's stress circuitry plays an important role in the development of the affective symptoms in these patients. In real life, temporarily becoming more sensitive to threatening information may contribute to survival, but in PTSD this response is pathologically extended. Patients are simply not able to ignore the shocking images, presumably because of a lack of inhibitory control over the amygdala.'

Lastly, Veer acquired RS-fMRI data from his healthy test candidates one hour after finishing the TSST, and found increased functional connectivity of the amygdala with the *default mode network*, an RSN mainly localized along the cortical midline. 'This network shows diminished activity when performing a task and increased activity when *not* doing so. Its function is especially being linked to introspection and self-referential processing. This is an interesting finding, because it might indicate that our brains actually take their time to evaluate how we have dealt with significant stressful events.'

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Depression-related connectivity changes in a ventral affective resting-state network.

Left: healthy controls. Middle: depression patients. Right: between groups comparison showing decreased amygdala functional connectivity in depression patients.

Figure adapted from Veer et al. (2010), Frontiers in Systems Neuroscience.

August 10



Professor Bernhard Hommel (Cognitive Psychology), together with Professor Reinout Wiers and Dr Sanne de Wit of the University of Amsterdam, is awarded a € 500,000 grant by the Netherlands Organisation for Scientific Research (NWO). The NWO Programme of Excellence supports an interdisciplinary investigation into cognitive and motivational components of adaptive and maladaptive decision-making, integrating behavioural, genetic and brain research.

Slowing down on Khat or cocaine



Dr. Lorenza Colzato

‘For me, doing research is keeping an open mind and having fun,’ says dopamine specialist Dr Lorenza Colzato. In 2010, she published on a wide variety of subjects related to cognitive enhancement, but she is especially proud on the impact of her work on the brain-damaging effects of the recreational use of cocaine and Khat.

A glance at Dr Colzato’s list of recent publications reveals not only a focus on dopamine and cognitive flexibility and impulsivity, but also a number of other intriguing research themes. Can the depth of religious faith predict the depth of the attentional blink? Do Buddhists have a larger than average ‘spotlight of attention’? What is the effect of video gaming on cognition? Is a flexible mind associated with variations within genes of the dopamine system? Do homosexuals have special capacities (‘gaydar’) to detect potential partners? Does recreational cocaine use have detrimental effects on inhibitory control mechanisms? And is a similar increased impulsiveness seen in users of Khat?

As Colzato’s research focuses on topics that have potential societal relevance, the findings often attract media attention. Colzato warns against misinterpretation of the findings and is not always happy about the way she is cited in the media. An example is her publication on First-Person Shooter games. ‘Games like Doom or Call of Duty are very demanding, as you are really under pressure and need a lot of adaptive behaviour, and we were the first to show that people who spend a lot of time playing these games have higher cognitive flexibilities compared to non-gamers. It helps the natural reflexes, and makes players more responsive and able to switch between different tasks. But I have *never* said that playing violent video games is good for your children: the age limit is definitely 18 years!’

In order to test whether gaming really enhances cognitive flexibility, she now compares the effects of ten hours of active gaming with watching documentaries in students who never, or only rarely, played video games. In addition she studies gaming in the elderly ‘As people age, their flexibility declines; at present we are investigating whether certain type of strategic, non-violent games are helpful in increasing cognitive flexibility in the elderly.’

September 24

Leiden University and the LIBC are honoured to be hosting the Heineken lecture (‘Cooperation and Communication in Children and Chimpanzees’) by Professor Michael Tomasello, Co-Director of the Max Planck Institute for Evolutionary Anthropology in Leipzig. The Royal Netherlands Academy of Arts and Sciences awards Tomasello the 2010 Dr A.H. Heineken Prize for his multidisciplinary research in primates in general, and language acquisition processes in humans in particular.

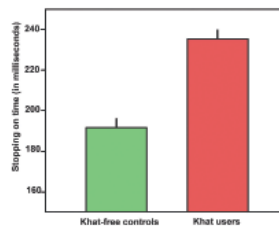


Another of Colzato's lines of research relates to the cognitive patterns associated with different religions. To study these patterns, Colzato uses a test in which participants stare at a computer screen with a large triangle or square made up either of smaller triangles or squares. They have to focus on either the major object or its component shapes, and indicate whether they are square or triangular.

This test has shown that both atheists and Calvinists recognize the large shapes more quickly than the small, embedded ones, but Calvinists pick out smaller shapes, i.e. more detail, slightly faster than atheists. Colzato has extended this visual attention research to Eastern religions such as Buddhism. Are Buddhists more oriented to the global picture? And what are the effects of meditation? 'We have a voluntary meditation coach who teaches people to meditate for 30 minutes, following which we investigate the effects on cognition. Different types of meditation, such as concentration on breathing or letting your thoughts flow, may give different results.'

In 2010, Colzato was first author of four publications on genetic variations in the dopaminergic control of intentional flexibility and dysfunctional impulsivity, including a paper in *Neuroscience*. But she is particularly proud of her research involving the effects of psychostimulant drugs such as cocaine and Khat. 'Chewing Khat leaves is very popular among people from Somalia, Ethiopia and Yemen, and we are the first to publish on the lasting damage of this practice on cognition. We used a simple test: a green arrow points unpredictably either to the left or right, and test subjects have to press left and right buttons respectively. But as soon as the arrow turns red, they have to stop. Khat users have problems in stopping on time; the delayed response is not enormous, but enough to cause them to brake slightly later when driving, for example, thus increasing the likelihood of causing an accident. This publication has received wide coverage, even on the Somali Government website.' Colzato also features in a documentary about the recreational use of cocaine, 'De witte waan', presented by Ellen ten Damme. 'DVD's of this documentary will be distributed to all Dutch schools. 'For me, the idea that some students may stop using cocaine because of this documentary is even more important than our publications in Neuroscience or receiving a VENI grant!'

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Khat users are slower at stopping on time than Khat-free controls

November 11



Professor Eveline Crone (Psychology) is awarded a € 1.5 million 'Starting Grant' by the European Research Council (ERC) to pursue her investigations on how brain development underlies advances in cognition and emotion in childhood and adolescence. She also participates in a Collaborative Research Project funded by the European Science Foundation, in which a team of investigators from the Netherlands, Belgium, Germany and England will address the intentional inhibition of human action.

Facts and figures 2010

Introduction

The Leiden Institute for Brain and Cognition (LIBC) started on January 1, 2006, as an interfaculty center for interdisciplinary research on brain and cognition, based on collaboration between the Leiden University Medical Center (LUMC) and the Faculties of Humanities (FH), Science (FS), and Social and Behavioural Sciences (FSS) of Leiden University. Since 2009, the LIBC is part of the university research profile area 'Brain Function and Dysfunction over the Lifespan'.

Particularly strong, profile-building interdisciplinary research areas within the LIBC are flagged by so-called 'hotspots'. Until 2014, one new hotspot per year will be officially launched. Each launch is accompanied by symposia and other (e.g., educational) activities with the aim to inform the broader public about related issues, and to further foster and facilitate research on this topic.

Current and future hotspots are:

- LIBC-Junior (launched 2009)
- LIBC-Language (launched in 2011)
- LIBC-Stress (to be launched 2012/2013)
- LIBC-Pharma (to be launched 2012/2013)

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Symposia and lectures

From 2006 till 2010, the LIBC organized the monthly colloquia. Starting in 2011, this format will be replaced by the new Sylvius Lectures, in which international experts will address topics of broad, interdisciplinary interest.

Symposia/Lectures organized by LIBC

February 8: Lecture by Professor dr. Antonio Damasio

Before receiving his Honorary Doctorate from Leiden University, Prof.dr. Damasio, Professor of Neuroscience at the University of Southern California, gave an interactive presentation titled: 'Thinking about Brain and Mind'.

Number of attendants: 200

February 15: Scientific symposium LIBC Junior

Nationwide introduction of LIBC Junior.

Initiators: Prof.dr. Paul van den Broek, Prof.dr. Hanna Swaab, Prof.dr. Michiel Westenberg and Prof.dr. Eveline Crone, with support of Prof.dr. Rien van IJzendoorn.

Number of attendants: 100

March 18: Public symposium 'Sleepless in Leiden'

Recent developments in sleep research.

Initiators: Prof.dr. Bernhard Hommel and Dr. Nic van der Wee.

Number of attendants: 200

May 15: Public symposium 'Kinderkopjes in Leiden'

A walk through the development of the brain, from baby till adolescent. Symposium on the occasion of the 87th lustrum of Leiden University.

Initiators: Prof.dr. Eveline Crone, Prof.dr. Marian Bakermans-Kranenburg.

Number of attendants: 400

September 24: The 'Heineken' Lecture

The Royal Netherlands Academy of Arts and Sciences awarded the Dr A.H. Heineken Prize for Cognitive Science (USD 150,000) to Prof.dr. Michael Tomasello of the Max Planck Institute for Evolutionary Anthropology in Leipzig, Germany. The Heineken Lecture 2010 was hosted by the LIBC in Leiden.

Number of attendants: 240

Invited international lectures of LIBC members: 35

Laureates

ERC Grants

The ERC Grants are subsidies for individual researchers and are awarded by the European Research Council. ERC Starting Independent Researcher Grants are awarded to excellent researchers who obtained their PhD between two and twelve years. The winners can use the subsidy (up to € 1.5 million) to set up their own research group.

- Prof.dr. Eveline Crone (FSS).

Marie Curie subsidies:

The EU's Marie Curie programme is intended to promote the mobility and career development of researchers during the whole course of their career and to advance academic knowledge within Europe. The subsidies available correspond to different stages in the researcher's development.

- Dr. Meni Yeari (FSS). Marie Curie Post-doctoral Fellowship for Career Development: € 170,000

NWO Vici

- Prof.dr. Marian Bakermans-Kranenburg (FSS). Grant: € 1,500,000

NWO Veni

- Dr. Berna Güroğlu (FSS). Grant: € 250,000

NWO Programme of Excellence

- Prof.dr. Bernhard Hommel (FSS). Grant: € 500,000

NWO Open Competition AiO project

- Dr. Guido Band (FSS). Grant: € 207,000
- Dr. Mark de Rooij (FSS). Grant: € 209,513

Other subsidies and grants:

European Science Foundation: Collaborative Research Projects

Prof.dr. Eveline Crone and others (FSS). Grant: € 220,000

Nationaal Initiatief Hersenen en Cognitie, consortium grant

Prof.dr. Serge Rombouts (coordinator) (FSS). Grant: € 2,383,000

Nationaal Initiatief Hersenen en Cognitie, consortium grant

Dr. Nic van der Wee (LUMC) and others. Grant: € 2,000,000

De Stichting de Avond van Wetenschap & Maatschappij

Prof.dr. Eveline Crone (FSS). Award: € 25,000

Publications

International, peer reviewed papers: 88 (see appendix)

Training and education

FMRI Analysis Course in the Psychology Master program: 15 MA and 10 PhD students attended.
Coordinator: Serge Rombouts.

The LIBC developed an interdisciplinary *minor program on Brain and Cognition* which started in the academic year 2009/2010 (coordinator: Dr. Maarten Bergwerff). We plan to further expand these teaching activities in the coming years. Fifty-three students from four different faculties attended this minor in the academic year 2010-2011.

Media appearances

The LIBC participates increasingly in public events, such as the national *Brain Awareness Week* (organized by the Dutch Neurofederation) and media events (newspaper, radio, television) about brain and cognition.

Radio interviews: 3

TV appearances: 6

Magazines and newspapers: 26

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Equipment

LIBC has currently access to the following equipment:

- 3T and 7T MRI scanners at the LUMC
 - 7T and 3T use: 1050 scan-hours
- MRI dummy scanner at the LUMC
- Electrophysiological labs at the FSS
- Neurofeedback lab at the FSS
- Psychophysiological lab at the FSS
- Infant labs (visual and auditory) at the FSS
- Systems for eye-movement measurements at the FSS
- More than 20 labs for behavioral research at the FSS
- Phonetics lab at the FH

Staff

Senior Researchers: 42

Post-docs: 10

PhD students: 43

Management assistant: 1

PhD's:

- Leijenhorst, L. van, January 19: *Why teens take risks*. Promotoren: prof.dr. E.A. Crone and prof.dr. P.M. Westenberg
- Keizer, A.W., February 18: *The neurocognitive basis of feature integration*. Promotor: prof.dr. B. Hommel
- Hammer, A., May 25: *The acquisition of verbal morphology in Cochlear Implanted and Specific Language Impaired children*. Promotoren: prof.dr. J.E.C.V. Rooryck, prof.dr. S.Gillis (Univ. Antwerpen) and prof.dr. M.M.R. Coene (VU A'dam)
- Verbist, A., May 25: *The acquisition of personal pronouns in cochlear-implanted children*. Promotoren: prof.dr. J.E.C.V. Rooryck and prof.dr. S.Gillis (Univ. Antwerpen)
- Zmigrod, S. Shafir, September 9: *Feature integration across multimodal perception and action*. Promotor: Prof.dr. B. Hommel
- Oei, N.Y.L., November 18: *Memory function after stress: the effects of acute stress and cortisol on memory and the inhibition of emotional distraction*. Promotor: Prof.dr. P. Spinhoven

Organizational structure:

Management Team:

Prof.dr. Serge A. Rombouts (Radiology, LUMC & Psychology, FSS), chair
Dr. Sander Nieuwenhuis (Psychology, FSS)
Dr. Nic van der Wee (Psychiatry, LUMC)
Prof.dr. Paul van den Broek (Education and Child Studies, FSS)
Prof.dr. Niels O. Schiller (Linguistics, FGW & Psychology, FSS)

Executive Board:

Prof.dr. Mark van Buchem (Radiology, LUMC), chair
Prof.dr. Lisa Cheng (Linguistics, FH)
Prof.dr. Bernhard Hommel (Psychology, FSS)
Prof.dr. Carel ten Cate (Biology, FS)

Scientific Advisory Board:

Prof.dr. Ron de Kloet (Leiden University), chair
Prof.dr. Harold Bekkering (Donders Institute & Radboud University, Nijmegen)
Prof.dr. David Norris (Donders Institute & Radboud University, Nijmegen)
Prof.dr. Frans Zitman (LUMC, Leiden University)
Prof.dr. Pienie Zwitserlood (Münster University, Germany)

Publications 2010

- Akbari Chermahini, S., Hommel, B. (2010). The (b)link between creativity and dopamine: Spontaneous eye blink rates predict and dissociate divergent and convergent thinking. *Cognition*, 115, 458-465.
- Akyürek, E.G., Schubö, A., Hommel, B. (2010). Fast temporal event integration in the visual domain demonstrated by event-related potentials. *Psychophysiology*, 47, 512-522.
- Arkin, E.B., Van Buchem, M.A., Haan, J., Ferrari, M.D., Kruit, M.C. (2010). An early 18th-century case description of cluster headache. *Cephalalgia*, 30 (11), 1392-1395.
- Bakermans-Kranenburg, M.J., Van IJzendoorn, M.H. (2010). Parenting matters: Family science in the genomic era. *Family Science*, 1, 25-35.
- Bakvis, P., Spinhoven, P., Giltay, E.J., Kuyk, J., Edelbroek, P.M., Zitman, F.G., Roelofs, K. (2010). Basal hypercortisolism and trauma in patients with psychogenic nonepileptic seizures. *Epilepsia*, 51(5), 752-9.
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Colophon

Editors

Jan Hein van Dierendonck
Marilyn Hedges
Barbara Floris
Mattanja Latuhihin
Serge Rombouts
Nic van der Wee

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