

Centre for Advanced Study

at the Norwegian Academy of Science and Letters

Annual Report 2005





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ANNUAL REPORT 2005

Centre for Advanced Study

The Centre for Advanced Study (CAS) is a private foundation. The CAS was established by the Norwegian Academy of Science and Letters in 1989, but its activities did not commence until the autumn of 1992. Its purpose is to bring Norwegian basic research and interdisciplinary theoretical work up to the highest international level within the humanities/theology, the social sciences/law, natural sciences/medicine and mathematics. The Centre rents offices at the Norwegian Academy of Science and Letters (NASL) at Drammensveien 78, N-0271 Oslo.

Outstanding researchers from Norway and abroad are nominated for one-year stays in the Centre. The activities are organized in three groups – one in the humanities, one in the social sciences and one in the natural sciences – each with from six to ten members whose affiliation is long-term. In addition come numerous researchers who spend shorter periods conducting research, altogether some 40–45 researchers of 10 to 15 nationalities a year. Each group is planned and organized around a unifying theme and headed by one or more outstanding researchers. The groups have no other obligations than their own research. They receive administrative and financial support from the Centre in formalized cooperation with six Norwegian universities and one high-level research college, i.e. the University of Oslo, the University of Stavanger, the University of Bergen, the University of Tromsø, the Norwegian University of Science and Technology in Trondheim, the Norwegian University of Life Sciences in Ås and Norwegian School of Economics and Business Administration in Bergen.

The Centre has a Board appointed by the Norwegian Academy of Science and Letters, the Norwegian Association of Higher Education Institutions and the Research Council of Norway.

Abbreviations used in the Annual Report

CAS	Centre for Advanced Study
KD	Ministry of Education and Research
NASL	Norwegian Academy of Science and Letters
NetIAS	European Network of Institutes of Advanced Study
NTNU	The Norwegian University of Science and Technology
RCN	The Research Council of Norway
UHR	The Norwegian Association of Higher Education Institutions
UiS	University of Stavanger
UiT	University of Tromsø
USIT	University of Oslo's Centre for Information Technology

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The board

Professor Aanund Hylland

Chairman

University of Oslo – NASL



Pro Rector Gerd Bjørhovde

Vice Chairman

University of Tromsø – UHR



Professor Hans Barstad

University of Oslo – NASL



Professor Eivind Hiis Hauge

The Norwegian University of
Science and Technology – UHR



Professor Leif Arne Heløe

Norwegian Institute for Urban
and Regional Research – RCN



Professor Kenneth Hugdahl

University of Bergen – NASL



Research Director Ingvild Broch

Alternate (for Bjørhovde)

University of Tromsø/
Norwegian Association of
Higher Education Institutions –
UHR, until 7.9.2005



Professor Jens G. H. Iversen

Alternate (for Hugdahl)

University of Oslo – NASL



Professor Rune Nilsen

Alternate (for Hauge)

University of Bergen – UHR



Professor Ivar B. Ramberg

Alternate (for Hylland)

Ramberg Consulting AS
– NASL



Secretary General

Anne Lise Ryel

Alternate (for Heløe)

The Norwegian Cancer Society
– RCN



Professor Lars Walløe

Alternate (for Barstad)

University of Oslo – NASL



Secretary General Professor
Reidun Sirevåg

Observer

The Norwegian Academy of
Science and Letters

The administration

Professor Willy Østreng
Scientific Director



Unn Haaheim Hagen
Office Manager



Maria M. L. Sætre
Senior Executive Officer



Marit Finnemyhr Strøm
Executive Officer



Research groups

2004/2005

Professor Jan Trulsen
University of Oslo
Group leader
Turbulence in Plasmas and Fluids



2005/2006

Professor Jakob Lothe
University of Oslo
Group leader
Narrative Theory and Analysis



Professor Hans L. Pécseli
University of Oslo
Group leader
Turbulence in Plasmas and Fluids



Professor Michael Hoel,
University of Oslo
Group leader,
Environmental Economics:
Policy Instruments, Technology
Development, and International
Cooperation



Professor Terje Sagvolden
University of Oslo
Group leader
Attention-Deficit/Hyperactivity
Disorder (ADHD) from Genes to
Therapy



Professor Ørnulf Borgan,
University of Oslo
Group leader
Statistical Analysis of Complex
Event History Data



Professor Jan Terje Faarlund
University of Oslo
Group leader
Linguistic Theory and
Grammatical Change



Professor Odd O. Aalen
University of Oslo
Group leader
Statistical Analysis of Complex
Event History Data



ANNUAL REPORT 2005

1. Administrative matters

The Board is the highest governing body of the Centre. Its composition is regulated by Article 4 of the Memorandum of Association, which reads as follows: “The Board of the Norwegian Academy of Science and Letters and the Norwegian Association of Higher Education Institutions each appoint two members with alternates to the Board of the Centre. In agreement with the Norwegian Association of Higher Education Institutions (UHR) the Academy appoints one additional member who shall be the chairman of the Board, and it appoints the latter member’s alternate. ... The State nominates the sixth member of the Board. In agreement with the Norwegian Association of Higher Education Institutions the Academy appoints one of the other members to be vice-chairman of the Board. ... The Board of the Norwegian Academy of Science and Letters has the right to appoint one of its members to serve as an observer on the Board of the Centre for Advanced Study.” The representative of the State is appointed by the Research Council of Norway (RCN).

In 2005 the Board was comprised of the following members:

Professor Aanund Hylland, University of Oslo (chairman) — NASL

Professor Kenneth Hugdahl, University of Bergen – NASL

Professor Hans Barstad, University of Oslo – NASL

Pro-rector Gerd Bjørhovde, University of Tromsø (vice-chairman) – UHR

Professor Eivind Hiis Hauge, The Norwegian University of Science and Technology – UHR

Professor Leif Arne Heløe, The Norwegian Institute for Urban and Regional Research in Oslo– RCN

Secretary General Professor Reidun Sirevåg, observer for NASL

Alternates:

Professor Ivar B. Ramberg, Ramberg Consulting AS – NASL (for Hylland)

Professor Jens G. H. Iversen, University of Oslo – NASL, (for Hugdahl)

Professor Lars Walløe, University of Oslo – NASL (for Barstad)

Professor Rune Nilsen, University of Bergen – UHR (for Hauge)

Research Director Ingvild Broch, University of Tromsø/Norwegian

Association of Higher Education Institutions – UHR (for Bjørhovde), until
7.9.2005

Rector Sigmund Grønmo, University of Bergen – UHR (for Bjørhovde)
from 7.9.2005

Secretary General Anne Lise Ryel, The Norwegian Cancer Society – RCN
(for Heløe)

The Board had 4 meetings in 2005. At these the following main items of business were discussed and/or decided: Selection of research groups for 2007/2008, accounts 2004, budget 2005, Annual Report from the Board 2004, half-yearly accounts 2005, approval of the co-operation agreement with the University of Stavanger, revision of the co-operation agreement with the University of Tromsø, implementation of the process for finding candidates for 2008/2009, evaluation of the nomination process for the research groups 2007/2008, participation in *European Network of Institutes of Advanced Study* (NetIAS), organisation/funding of multidisciplinary and interdisciplinary research at the CAS, preliminary discussion of the quality requirements for scientific publications under the auspices of the Centre, re-negotiation of the rental agreement with the Academy, renewal of the Scientific Director's fixed term of appointment, pay adjustments and miscellaneous decorating and maintenance projects.

1.1 Management and administration

The administration consisted of four members of staff and three collaborators with part-time affiliation. Professor Willy Østreng has been engaged for a fixed term as Scientific Director with responsibility for the daily running of the Centre and its academic activity. Office manager Unn Haaheim Hagen is in charge of the daily administrative activity, while Senior Executive Officer Maria Sætre's principle duties concern the Centre's external activities, including updating and maintenance of the Web pages, as well as responsibility for the running of the filing and library services. Executive Officer Marit

Finnemyhr Strøm is responsible for manning the switchboard, registering researchers, sending out post and information material as well as general administrative support. In addition Project Manager Bjarne Røsjø at *Faktotum Informasjon A/S* was co-editor of the CAS Newsletter and was involved on the production side of the Centre's book project: *Convergence. Interdisciplinary Communications 2004/2005*. Geir Emblemsvåg and Tarjei Solvang Tjønn at the *University of Oslo's Centre for Information Technology (USIT)*, were responsible for the running of the computer system and the provision of computer assistance to the researchers.

The permanent administration has weekly meetings at which matters of importance for the current activity are discussed, and at which plans are made for the future. In addition a number of meetings have been held between the administration and the leaders of the research groups that will be coming to the Centre at a later date. The purpose of these meetings is to give support to the groups in the planning of and preparation of their stay. Experience has shown that those groups that put effort into the planning phase are rewarded with academic gains in the implementation phase. The administration attaches great importance to these meetings.

Deliberations with the Contact Committees at the seven universities were strengthened, inter alia through annual meetings between the respective committees and the Scientific Director. At these meetings, which have also been supplemented by meetings with the University Management consensus was reached on the replacement of the existing Contact Committees by the Universities' Research Councils and/or Deans. The object of this change is to ensure that CAS has an integrated, natural and central place in the internal academic planning processes of the individual universities. It means that the universities will themselves nominate their Contact Committees whereas they previously were informally recruited by CAS. So far the Norwegian University of Life Sciences, The Norwegian School of Economics and Business Administration, The University of Stavanger and the University of Tromsø have adopted the new system. The University of Bergen is prepared to do likewise, and signals have been given to the effect that NTNU and the University of Oslo will adopt corresponding changes in connection with the negotiations that are underway concerning renewal of co-operation agreements that expire 1 January 2007.

Talks were initiated with the University of Tromsø (UiT) concerning revision of the existing co-operation agreement. Consensus was reached that the agreement shall be worded as the co-operation agreements that apply to the Centre's other six partners. This entails the payment of full salary by the University of Tromsø to those of their researchers who are granted extraordinary research leave at CAS as is the case with the other universities and colleges.

Negotiations were initiated and concluded with the University of Stavanger (UiS) concerning a five-year co-operation agreement. The agreement was signed 1 October 2005, the content of which is identical to that which applies to the other universities/colleges.

Concerning academically orientated measures, the Centre has also in 2005 continued the Wednesday seminars. The purpose of these seminars is to stimulate communication, dialogue and contact cutting across research fields, groups and disciplines (see page 67). This measure is one of several intended to strengthen the Centre's interdisciplinary profile and objective.

The editorial staff of the Newsletter has planning meetings prior to the publication of each issue based on preceding discussions at the administration meeting. Each issue contains an account of the research groups' work and a leader that addresses current research-political topics of interest and importance to the Centre's activity.

1.2 Other matters

Based on feedback the administration has had from researchers, the working environment at the Centre is considered to be good. In 2005 absence due to illness totalled 58 days. The Centre's activity does not pollute the external environment.

2. The purpose and work of the Centre

The Centre sees it as an important task to further the work of realising the objectives that were formulated in the Memorandum of Association:

- A. The academic activity at the Centre shall be known to satisfy the highest international standards and thereby contribute to raising the level of basic and interdisciplinary theoretical research in Norway within the fields of the humanities/theology, social science subjects/law and the natural sciences/medicine/mathematics.
- B. The academic activity of the Centre shall be long-term, independent and of a permanent nature.
- C. The Centre shall be a national institution, and contribute to wide publicising of the results that are produced.
- D. The Centre shall provide the setting for close academic co-operation between researchers from Norway and abroad.

An important element in the task of realising these aims is the recruitment of collaborators who can show evidence of international academic results of the highest standard. At the same time the Centre wishes to encourage the broadest possible co-operation within the framework of the system of thematic groups. This form of teamwork appears to be functioning extremely well with the size, the academic weight and the youthful constituents (at post-doctoral level) that each group has. The social and academic contact between the three subject groups reinforces both the academic and the social sense of community at the Centre. The weekly Wednesday seminars are one of several measures to promote such contact. 27 joint seminars were held between the different research groups in 2005 (see page 67). The seminars will be continued in 2006 and will constitute a permanent part of the interdisciplinary and multidisciplinary activity of the Centre. In 2005 the Centre published the book: *Convergence. Interdisciplinary Communications 2004/2005* based on the Wednesday seminars of the same year. This book is the second in a series of annual publications from CAS about multi- and interdisciplinary communication and inter-action between the project groups. The first book was published in 2004 and was entitled *Synergies. Interdisciplinary Communications 2003/2004*. The series is edited by the Scientific Director.

The increase in the budget from the Ministry of Education and Research (KD) during the period 1998–2002 has made possible a reinforcement of the administrative service provision to the visiting researchers, and has laid the foundation for increasing the direct financial support to the projects. Both contribute to making the Centre a more attractive place for outstanding researchers and to increasing the degree to which the Centre realises its objectives.

The three groups have at their disposal 6 offices each, of which some may accommodate more than one researcher. Nevertheless, there is at times a great shortage of space, and it would have been desirable to have a further increase in the number of available offices. The Centre is continually in dialogue with the Academy of Science and Letters with a view to increasing the office space at its disposal in order to have more space for the library, archives and meetings. For the time being there is not sufficient space to be found in the Academy of Science and Letters for such an expansion.

3. Research groups and academic activity

The three groups that started their work in the autumn of 2004 and continued their projects in the spring of 2005, worked on the following topics.

- ***Turbulence in Plasmas and Fluids***
headed by Professor Hans L. Pécseli and Professor Jan Trulsen, University of Oslo
- ***Linguistic Theory and Grammatical Change***
headed by Professor Jan Terje Faarlund, University of Oslo
- ***Attention-Deficit/Hyperactivity Disorder (ADHD) from Genes to Therapy***
headed by Professor Terje Sagvolden, University of Oslo

The project *Turbulence in Plasmas and Fluids* aimed at shedding light on selected central issues concerning turbulent transport with emphasis on applications in nature. The phenomenon turbulence is completely essential to such different things as life in the sea, the spread of pollution in the atmosphere and in order to be able to build a nuclear power station. Turbulence in fluids and plasma (i.e. gases consisting of electrically charged particles) is one of the least understood areas of physics. The problem concerns randomly varying

currents where individual realisations are too complex to be understandable but which nevertheless may be described and analysed by the use of statistical methods. As far as plasma is concerned the situation is even less favourable. In this case the sensitivity of the gas to electrical and magnetic fields contributes to increasing the complexity and progress in this research is only achieved through seriously simplified hypotheses which it may not always be possible to justify. One of the most important properties of turbulent fluctuations in gases and fluids is their ability to spread particles at abnormally high speed. This implies that the boundary layer in space may be sustained only in the degree to which the turbulent transport allows. Correspondingly the electrical conductivity of plasma is often controlled by turbulence. This issue would seem to be of ultimate significance for the understanding of the large-scale current systems that are associated with the Earth's magnetosphere. The project was multi- and interdisciplinary. For a more comprehensive presentation of the project and its provisional results please see the group report in page 31.

The project *Linguistic Theory and Grammatical Change* aimed at formulating new theories of language internal conditions for grammatical change over time. The point of departure for this work is empirical material from different languages and more recent linguistic theory. The central theme was the principles and mechanisms that are the underlying cause of syntactical change. Changes that take place over the course of time may be observed in all languages. Such changes may have demonstrable external causes, but these can as a rule only explain why a change in the language has occurred, not why the result is as it is. For this one needs linguistic theories about grammar and internal language structure. The project had zealous ambitions of analysing the relationship between the inner structure of the language and grammatical changes taking as its point of departure recent research on the relationship between language learning and changes in language. In order to achieve this the project group needed material from different languages and language families. This reflected the groups composition which included experts on old Germanic languages, Latin and Romance languages, Finno-Ugrian languages, Caucasian languages and American Indian Languages. Some of the group members worked with generative grammar whilst others had their theoretical base in more functional and typological language theories. The group was comparative and multi-disciplinary in its approach, but all of its members were linguists. For a more comprehensive presentation of the project and its provisional results please see the group report in page 41.

The project *Attention-Deficit/Hyperactivity Disorder from Genes to Therapy* aimed to bridge the gap between basic research and the clinical understanding of ADHD which is the disorder that occurs most frequently in child psychiatry. Between three and five percent of all boys, and not quite so many girls have brains which produce an inadequate amount of the signal transmitting chemical dopamine. This chemical plays an important part in the process of learning and memorising and an imbalance in the dopamine system may have far reaching consequences for the person concerned and for society in general. Norwegian studies show, among other things, that as many as 30 percent of male inmates in Norwegian prisons have ADHD. As yet there has not been any organised, systematic international project co-operation over a sustained period between the clinical and the basic research side aimed at studying the interplay between social and genetic factors in the development and diagnosis of ADHD. The group was comprised of mathematicians, medical people, psychologist and neurobiologists who collected and systematised existing knowledge of ADHD with a view to developing new theories (as well as mathematical models) and hypotheses which could be tested experimentally. The group wished among other things, to see whether it was theoretically possible to develop a method of diagnosis built on computer and video games. The group had an interdisciplinary approach. For a more comprehensive presentation of the project and its provisional results please see the group report in page 56.

The research groups 2005/2006 started their work in August 2005. The research themes for these groups are:

- ***Narrative Theory and Analysis***, headed by Professor Jakob Lothe, University of Oslo
- ***Environmental Economics: Policy Instruments, Technology Development, and International Cooperation***, headed by Professor Michael Hoel, University of Oslo
- ***Statistical Analysis of Complex Event History Data***, headed by Professor Odd O. Aalen and Professor Ørnulf Borgan, University of Oslo

Newsletter No. 2, 2004 provides an account of the 2004/2005 groups' activity, while *Newsletter* No. 1, 2005 gives an account of selected research topics for these projects. *Newsletter* No. 2, 2005 provides an account of the 2005/2006 groups' activity.

These Newsletters are to be found in both English and Norwegian editions on the Centre's Web pages: www.cas.uio.no.

In June 2005 the Board completed its business relating to the nomination of those groups that are to be at the Centre in 2007/2008. The number of proposals was 15, which was fewer than the year before. After the Board had dealt with the matter on two occasions, 10 proposals were sent for international peer review in the spring of 2005. Altogether 56 evaluation reports were procured from outstanding, independent international researchers. On this basis the Board resolved to invite the following research groups for the academic year 2007/2008:

- ***The Power of the Ruler and the Ideology of Rulership in Nordic Culture 800–1200***, headed by Professor Gro Steinsland, University of Oslo
- ***Understanding Innovation***, headed by Professor Jan Fagerberg, University of Oslo
- ***Nature-inspired Energy Efficient Process Design***, headed by Professor Signe Kjelstrup, The Norwegian University of Science and Technology (NTNU) in Trondheim

In the autumn of 2005 the selection process was begun for 2008/2009. The Centre received a large number of proposals, a total of 25, all of which went on to the next round. Four candidates have decided to withdraw their applications due to too much pressure of work. The Centre has never before received so many nominations as for this year.

4. Other academic activities

In the course of 2005 the Scientific Director has produced several academic works, including editing a book and has had articles accepted in journals evaluated by peers. He has also been invited to lecture at national and international conferences and meetings within his own area of research. See page 69.

5. Objectives and results

In the course of the year 61 researchers have made research contributions to the Centre's 6 projects. 56 of these spent longer periods (from one month to ten months) at the Centre. The international contingent has been large. 22 researchers from 9 countries¹ and 3 continents participated in the research. In the spring of 2005, 26 researchers were working at the Centre for longer periods. Of these 13 were Norwegian researchers and 13 came from other countries. During this period the Centre was the place of work for 3 post-doctoral fellows and 3 doctoral degree fellows. In addition a large number of seminar and conference participants made scientific contributions to the individual project groups, cf. the group reports pages 31, 41 and 56.

In the autumn of 2005, 35 researchers were working at the Centre. Of these 27 spent a long period at the CAS, 7 of them leading Norwegian researchers, 13 were from abroad and 6 younger researchers (1 post-doctoral, 5 doctoral degree fellows). In addition come a large number of external seminar and conference participants.

Major seminars and workshops with broad national and international participation have now become a natural part of the academic activity in all the groups. 8 workshops/seminars of this sort were organised in 2005. Several of the groups have also planned summing up and evaluation seminars following the stay at the CAS. In addition a series of internal working seminars were organised within and between the groups, (cf. the group reports).

The interaction between the researchers from abroad and those from Norway and the many lectures given by the researchers from abroad at Norwegian universities and in other academic fora (such as the Norwegian Academy of Science and Letters), represents an important contribution to the internationalisation of Norwegian research in general and are a significant result in themselves, (cf. the group reports).

The Centre is expecting numerous peer-evaluated publications in the form of books, articles in international journals and databases as a result of its activity. Due to the length of time the printing process takes it is impossible

1 The Netherlands, England, Denmark, Germany, USA, Israel, South Africa and Canada.

at the present time to have a complete survey of the results of the work done in 2005. Some works have already been published, but most of them are either being evaluated, are available in manuscript or are still being worked on and evaluated. A complete survey of the results of the work carried out this year will not be available for some years. The reports from the three research groups for spring 2005 show that the provisional figure for published reports and/or reports still in progress or that have been sent for publication has already reached a total of 120 works. To this may be added the 32 articles published in the book: *Convergence. Interdisciplinary Communications 2004/2005*, CAS, Oslo 2005.

In addition the following objectives were achieved in 2005:

- The selection process for new research groups now maintains a high international level and is constantly being improved. Peer-evaluation spans an 8-month period and is carried out in four evaluation stages before the nine best projects become the object of an independent international evaluation. In 2005 there were on average 5, 6 independent international peer-evaluations per project for the academic year 2007/2008.
- The Newsletter is now established in a good format and maintains a high standard. It appears twice yearly in Norwegian (12,000 copies) and English (1,000) copies. The Newsletter is distributed to all those working with basic research in Norway and to researchers from abroad who have previously been affiliated to the Centre.
- Contact with good Norwegian researchers outside the Oslo area has been improved, and there has been a significant increase in the number of nominated group leaders and project participants from the other universities.
- Contact with the subject communities is ensured through the Contact Committees that have been established at all the universities and co-operating colleges. This arrangement works well, one example of this being the annual meetings with the Scientific Director.
- The co-operation arrangement that the CAS has with the five Norwegian universities and the Norwegian College of Economics and Business Administration has been extended to include the University of Stavanger (UiS). The co-operation agreement with UiS came into effect on 1 October 2005. In the course of the last two and a half years the number of co-operating partners has increased from four to seven institutions and now includes the University of Tromsø, the University of Bergen, the Norwegian University of Science and Technology, the University of Oslo, the University of Stavanger,

the Norwegian University of Life Sciences and the Norwegian College of Economics and Business Administration. Other candidates who wish to co-operate are subject to on-going evaluation by the Centre.

- The co-operation agreement with the University of Tromsø is subject to re-evaluation. This means that it will be identical to the other co-operation agreements and that researchers from the UiT who are invited to the Centre will retain their salaries from the University.
- Attempts have been made to hold the Centre's internal seminars at universities outside Oslo so that these communities are given the opportunity of participating in and profiting from the on-going work at the Centre. This contributes to a strengthening of the CAS' position as a common national arena for basic research in Norway. The Centre will consider the possibility of further developing this facility and making it an integral part of its co-operation with the universities and colleges.
- The excellent, constructive and mutually obligating co-operation with the universities and colleges in Norway, the Norwegian Academy of Science and Letters, the Norwegian Association of Higher Education Institutions and the Research Council was carried further in the period covered by this Report.
- Work on establishing closer contact with international sister organisations was further strengthened in 2005. This was mainly achieved through work in NetIAS in order to give the CAS' European sister organisations a place and a role in the formulation of the EU's Seventh Research Framework Programme. CAS also had co-operation talks with the heads of Collegium Budapest which is CAS' sister organisation in Hungary.
- The multidisciplinary and interdisciplinary component of the Centre's work has been strengthened through the weekly lunch seminars.
- External publicising of the activities at the Centre was until recently to a great extent done by means of published works on particular subjects and the CAS Newsletter. The book, *Convergence*, is an undertaking aimed at stimulating the inter- and multidisciplinary component of the Centre's work. In addition it imparts the individual results of on-going research. The book is published in a total of 1000 copies and is distributed free to a series of research communities at home and abroad and may be obtained on request.

6. Finance

6.1 The Centre for Advanced Study

The State Grant for 2005 amounted to NOK 14,070,000. Compared to the previous year the increase in the sum received was NOK 465,000, i.e. 3,4 %. This increase does not entirely compensate for price and pay adjustments and has therefore not brought the Centre significantly closer to the grant target of around 15 million NOK that the evaluation committee (the Bjørge Committee) recommended as early as 1997. There is still the sum of approx. 1 million NOK to go before the contribution from the State is on the recommended level. The absence of any real increase the last three years means that the work on building up a reference library and a collection of books and journals in science and the humanities is coming to a standstill. The same applies to the need for an improvement of technical computer support for the researchers. The CAS' sister organisations in other western countries have computer officers and librarians working full-time.

The reordering of priorities on the Centre's budget for 2005 made it possible to increase the groups' budget for 2004/2005 to 3 million NOK each. This was an increase on the preceding year of NOK 200,000 to each of the groups. The funds that the Centre makes available to the three research groups is to cover general costs of the project as well as fellowships and buying out researchers from abroad, including accommodation, travel, conference and seminar expenses. The available resources were until recently far too limited for a sufficiently large number of really leading international researchers to be brought to Norway. To the extent that the financial circumstances permit, the Centre will give greater priority to this in the future. In order to be able to buy out the best researchers from abroad for a lengthy research stay, each group will need an increase in available funds of about 1 million NOK in relation to today's level. That is to say that each group ought in the long term to be given a budget of 4 million NOK (2005 value).

As in previous years the university agreements represent considerable additional funding, since visiting researchers from Norwegian universities and co-operating colleges are in the main paid by their respective home institutions. This additional funding represents approximately 12 man-years.

The Norwegian Academy of Science and Letters has for several years also contributed to relieving the CAS' financial burden in the form of a favourable lease. The lease was renegotiated in 2001 and 2005. On these occasions the rent and the Centre's contribution to the shared costs were increased significantly, but are still at an acceptable level compared to market value.

The Centre's statement of Accounts for the year 2005 shows an operating surplus of NOK 1,656,307. This sum represents transferable funds for the research groups 2005/2006 for use in the spring 2006. These transfers are essentially the result of the fact that the academic year and the financial year do not coincide.

The balance sheet shows a balance of NOK 9,169,783. Of this sum NOK 1,132,816 represents short-term debt, while NOK 1,7 million is transferable money for the research groups 2005/2006. The Centre's net liquidity at the end of year was approximately NOK 6,3 million.

The accounts for 2005 were produced on the assumption of continued operation. In the view of the Board the annual statement of accounts submitted gives a fair indication of the development and results of the Centre for Advanced Study pr. 31.12.2005. The accounts were audited by the firm of auditors Nitschke AS.

6.2 The Operating Fund at the Centre for Advanced Study

The Centre enters into binding agreements for periods of up to three years ahead. The Operating Fund was established as a form of security in relation to these long-term obligations. The Operating Fund consists of the basic capital, which is untouchable, and disposable funds. No money from the Operating Fund was used in 2005. Net income from interest amounting to NOK 136,502 was added to the Fund so that the total capital of the Operating Fund at the end of the year was NOK 8,649,624.

The accounts for 2005 were produced on the assumption of continued operation. In the view of the Board the annual statement of accounts submitted gives a fair indication of the development and results of the Centre for Advanced Study pr. 31.12.2005. The accounts were audited by the firm of auditors Nitschke AS.

Centre for Advanced Study, 16 February 2006

To the Board of the Foundation
Centre for Advanced Study

AUDITORS' REPORT FOR 2005

We have audited the Annual Accounts of the Centre for Advanced Study for 2005, which show a surplus of NOK 1,802,375,-. We have also audited the information in the Annual Report concerning the Annual Accounts, and the assumption of continued operation. The Annual Accounts comprise the profit and loss account, balance sheet and notes. The Accounts have been done in conformity with the Accounting Act and good auditing practice. The Annual Account and the Annual Report have been submitted by the Board of the Foundation. Our responsibility is to express an opinion on the annual accounts and other matters in accordance with the requirements of the Auditors Act.

We have performed our audit in conformity with the law, regulations and good auditing practice in Norway and auditing standards adopted by the Norwegian Institute of Public Accountants. The auditing standards require that we plan and conduct the audit in order to achieve a satisfactory level of certainty that the annual accounts do not contain any significantly incorrect information. The audit comprises an examination of selected parts of the evidence in support of the information in the annual accounts, an assessment of the accounting principles applied and of important accounting estimates, and an evaluation of the content and presentation of the annual accounts. To the extent required by generally accepted standards of good auditing, the audit also includes an examination of the Foundation's asset management and of its accounting and internal control systems. We believe that our audit provides a satisfactory basis for our statement.

We are of the opinion that

- the annual accounts have been presented in conformity with statute law and regulations and reflect the Foundation's financial situation on 31 December 2005 and its result for the financial year in accordance with good auditing practice in Norway.
- the management has fulfilled its duty to ensure orderly and clear registration and documentation of information relating to the accounts in conformity with statute law and good accounting practice in Norway.
- the information in the Annual Report concerning the assumption that operations would continue is consistent with the annual accounts and is in conformity with statute law and regulations.

Stabekk, 16 February 2006

NITSCHKE AS

Morten Hurum
State-authorized auditor

7. Accounts

7.1 Accounts 2005 Centre for Advanced Study

Balance at 31 december		2005	2004
Assets:			
<i>Cash:</i>			
Cash, bank deposits etc.	(Note 5)	9 169 783	7 406 814
Other claims	(Note 6)	0	0
<i>Total cash:</i>		<i>9 169 783</i>	<i>7 406 814</i>
Total assets		9 169 783	7 406 814
Liabilities and capital and reserves			
<i>Capital and reserves</i>			
Basic capital	(Note 7)	116 000	114 900
Capital account		7 920 967	6 119 692
<i>Total capital and reserves</i>		<i>8 036 967</i>	<i>6 234 592</i>
<i>Short-term liabilities</i>			
Payable to the Norwegian Academy of Science and Letters		100 000	100 000
Payable tax deductions, National Insurance contributions, holiday pay etc.		371 780	374 642
Other short-term liabilities	(Note 8)	661 036	697 580
<i>Total short-term liabilities</i>		<i>1 132 816</i>	<i>1 172 222</i>
Total liabilities and capital and reserves		9 169 783	7 406 814

Oslo 16 February 2006

Board of the Centre for Advanced Study

Aanund Hylland,
Chairman of the Board

Gerd Bjørhovde,
Vice-Chairman

Eivind Hiis Hauge

Kenneth Hugdahl

Leif Arne Heløe

Hans M. Barstad

Profit and loss account	2005	2004
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Income from operations and running expenses:

Income from operations:

State grant from Ministry of Education and Research	14 070 000	13 605 000
The Research Council of Norway (Note 1)	100 000	0
Other contributions (Note 1)	0	0
Total income from operations	14 170 000	13 605 000

Operating expenses:

Expenses relating to research fellows (Note 2)	6 865 890	5 552 717
Salaries, fees etc. (Note 3)	2 180 559	2 151 376
Office furniture, furnishings, computer equipment	169 403	420 162
Other operating expenses (Note 4)	3 297 841	2 596 538
Total operating expenses	12 513 693	10 720 793

Operating result	1 656 307	2 884 207
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Financial income and financial expenditure:

Income from interest	154 181	94 317
Bank charges	8 113	8 276
Net financial income	146 068	86 041

<i>Annual balance</i>	<i>1 802 375</i>	<i>2 970 248</i>
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which is to be allocated as follows:

To the Basic capital	1 100	1 100
To(from) the Capital account	1 801 275	2 969 148

Accounting principles:

The Accounts have been set out in conformity with the Accounting Act and good accounting practice.

Cash and short-term liabilities normally include items falling due within one year.

Pension premiums are linked to the employer's share of the premium payable to the Public Service Pension Fund.

Notes on the Accounts	2005	2004
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Note 1 Other contributions:

The Research Council of Norway	100 000	0
Total;	100 000	0

Note 2 Expenses relating to research fellows:

Fellowships etc., researchers	2 971 636	2 571 769
Rent for researchers' flats	1 321 634	1 057 843
Travel expenses	623 341	663 296
Publications, printing, equipment	225 684	309 009
Seminars/Workshops	1 696 379	915 065
Miscellaneous expenses research groups	27 216	35 735
Total	6 865 890	5 552 717

Note 3 Salaries/fees:

Salaries/holiday pay	1 695 298	1 669 452
Pension premiums	180 696	113 052
National Insurance Contributions	240 840	239 830
Manpower services	13 750	89 512
Auditors' fees	38 125	37 820
Social expenditure	11 850	1 710
Total	2 180 559	2 151 376

The sum of NOK 40 000.- was paid out as remuneration to members of the Board
Auditing expenses cover in their entirety auditing services

Note 4 Other operating expenses	2005	2004
Lighting, heating, cleaning, rent, insurance, security	625 332	608 515
Telephone, fax, postage	198 731	130 965
Equipment, copying, computing	490 095	541 181
Books, library service, printing	757 847	489 512
Operating equipment, maintenance	368 603	200 145
Running the canteen, social measures and representation	425 348	374 537
Travel expenses	58 053	56 203
Miscellaneous expenditure	373 832	195 480
Total	3 297 841	2 596 538

Note 5 Bank deposits

Of the bank deposits entered in the books, the sum of NOK 219,256 represents withheld tax deductions

Specification of bank deposits on 31.12.:

DnB NOR, account 8200.01.17044	NOK	219 256	215 796
DnB NOR, account 1607.83.68385	NOK	8 925 822	7 170 594
DnB NOR, account 1644.14.60264	NOK	4 433	4 374
DnB NOR, account 8210.04.35809	NOK	1 514	1 335
Total bank deposits	NOK	9 151 025	7 392 099
Cash balance 31.12.	NOK	18 757	14 715
Total cash, bank etc.	NOK	9 169 783	7 406 814

Note 6 Claims

Claims are put at their nominal value

Note 7 Basic capital

10% of a calculated yield on the Basic capital throughout the year is allocated to the Basic capital.

Note 8 Other short-term liabilities

This entry consists of items with a time limit at the end of the year.

7.2 Accounts 2005 Operating Fund at the Centre for Advanced Study

Balance at 31 December		2005	2004
Assets:			
<i>Cash:</i>			
Bank deposit	Note 1	8 649 624	8 513 122
<i>Total cash</i>		<u>8 649 624</u>	<u>8 513 122</u>
Total assets		8 649 624	8 513 122
Liabilities and capital and reserves			
<i>Capital and reserves:</i>			
Basic capital	Note 2	1 276 210	1 262 510
<i>Disposable funds</i>		<u>7 373 414</u>	<u>7 250 612</u>
<i>Total capital and reserves</i>		<u>8 649 624</u>	<u>8 513 122</u>
Total liabilities and capital and reserves		8 649 624	8 513 122

Oslo 16 February 2006

Board of the Centre for Advanced Study

Aanund Hylland,
Chairman of the Board

Gerd Bjørhovde,
Vice-Chairman

Eivind Hiis Hauge

Kenneth Hugdahl

Leif Arne Heløe

Liv Bliksrud

Profit and loss account	2005	2004
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Income:

Income from interest	136 502	108 676
Annual balance	136 502	108 676

which it is proposed to allocate as follows:

To the basic capital	13 700	10 900
To Disposable funds	122 802	97 776
	136 502	108 676

Notes on the Accounts for the period ending 31.12.2005

Note 1 Bank deposit

Specification of bank deposit for the period ending 31.12.2005:

Sparebanken NOR, account 8200.06.22903, balance	8 649 624	8 513 122
Total	8 649 624	8 513 122

Note 2 Basic capital

The Basic capital has increased by 10 % of the annual yield.

To the Board of the Operating Fund
Centre for Advanced Study

AUDITORS' REPORT FOR 2005

We have audited the Annual Accounts of the Centre for Advanced Study for 2005, which show a surplus of NOK 136,502,-. We have also audited the information in the Annual Report concerning the Annual Accounts, and the assumption of continued operation. The Annual Accounts comprise the profit and loss account, balance sheet and notes. The Accounts have been done in conformity with the Accounting Act and good auditing practice. The Annual Account and the Annual Report have been submitted by the Board of Operating Fund. Our responsibility is to express an opinion on the annual accounts and other matters in accordance with the requirements of the Auditors Act.

We have performed our audit in conformity with the law, regulations and good auditing practice in Norway and auditing standards adopted by the Norwegian Institute of Public Accountants. The auditing standards require that we plan and conduct the audit in order to achieve a satisfactory level of certainty that the annual accounts do not contain any significantly incorrect information. The audit comprises an examination of selected parts of the evidence in support of the information in the annual accounts, an assessment of the accounting principles applied and of important accounting estimates, and an evaluation of the content and presentation of the annual accounts. To the extent required by generally accepted standards of good auditing, the audit also includes an examination of the Operating Fund's asset management and of its accounting and internal control systems. We believe that our audit provides a satisfactory basis for our statement.

We are of the opinion that

- the annual accounts have been presented in conformity with statute law and regulations and reflect the Operating Fund's financial situation on 31 December 2005 and its result for the financial year in accordance with good auditing practice in Norway.
- the management has fulfilled its duty to ensure orderly and clear registration and documentation of information relating to the accounts in conformity with statute law and good accounting practice in Norway.
- the information in the Annual Report concerning the assumption that operations would continue is consistent with the annual accounts and is in conformity with statute law and regulations.

Stabekk, 16 February 2006

NITSCHKE AS

Morten Hurum
State-authorized auditor



Opening Ceremony 2005

The opening of the 14th academic year of the Centre for Advanced Study took place at the Norwegian Academy of Science and Letters, September 6th 2005.

Photo: Bård Gudim



The group leader of Narrative Theory and Analysis, Professor Jakob Lothe, University of Oslo, gave the lecture: "Narrative, History, Fiction: The Example of the Holocaust".



Opening Ceremony 2005

Chairman of the board, Professor Aanund Hylland (UiO.)



Scientific Director, Professor Willy Østreg and the Ambassador of the Royal Netherlands Embassy, H.E. Mr. Erik Ader.

Group leaders 2004/2005, Professors Hans L. Pécseli and Jan Trulsen.



Professors Beatrice Sandberg (UiB) and Irene Kacandes (Dartmouth College, USA).

Reports from the research groups of 2004/2005

Turbulence in fluids and plasmas

Report by Hans L. Pécseli and Jan Trulsen
Group leaders 2004/2005

1. General description

The main topics of the project were associated with numerical studies of turbulence in fluids and plasmas, by involving analysis of existing data as well as obtaining new theoretical and numerical results. The present summary can most conveniently be separated into two parts:

- A. Our studies of turbulence in neutral fluids were carried out with explicit reference to the presumed importance of turbulence for the feeding process of aquatic micro-organisms. For these studies we had initially one database at our disposal, where the motions of many small polystyrene particles were followed, where these particles could be used as representing aquatic micro-organisms. These results were obtained by experimental studies at the Risø National Laboratory in Denmark. As a consequence of the success of the first investigations, we were approached by colleagues from Italy, giving us access to related simulation results from some of the largest numerical simulations of turbulent flows carried out today. These results were obtained by direct numerical solutions of the Navier-Stokes equation. The parameter range of these two datasets supplements those from the laboratory, by having a Reynolds number approximately twice as large. Although, of course, also the simulation data have their limitations, we were nonetheless able to provide estimates with unprecedented accuracy of, for instance, the turbulent particle fluxes to a perfectly absorbing spherical surface.

B. Studies of plasma wave phenomena. Most of this activity was based on numerical methods. Two approaches were used: a fluid type code, where a set of model equations (the ideal compressible MHD equations) were solved numerically. One such method of solution (Smooth Particle Hydrodynamics, or simply SPH) was analyzed in detail. Particular attention was given to cases possessing certain symmetries. As an alternative we have a Particle-In-Cell (PIC) code, where the motions of a large number (up to 40 million) of interacting simulation particles are followed numerically. Great efforts were made to represent particle collisions, collisions between charged and neutral particle in particular, correctly. For the time being, we are able to handle relatively low energy particles, involving elastic and charge exchange collisions. These effects are particularly important for ionospheric plasmas, and also for industrial applications.

2. Participants

The following scientists had a long term association with the project (listed in alphabetic order):

- Dr. Steinar Børve, University of Oslo, Norway. Expertise: numerical studies of neutral flows and plasmas. Two basically different types of approaches were considered: one consisting in a direct numerical solution of model equations consisting of several nonlinear partial differential equations, including as a special case the so called Magneto-HydroDynamic-equations (MHD). The alternative PIC-code approach was used for studying the space-time evolution of small scale structures in plasmas.
- Dr. Lars P. Dyrud, Department of Astronomy, Boston University, USA. Expertise: numerical simulations of ionospheric plasmas where collisions between neutrals and charged particles are important. Particular attention is given to unstable cases, where a current across the magnetic field drives low frequency waves to large amplitudes.
- Dr. Patrick Guio, Parallab, Bergen Centre for Computational Science, Norway. Expertise: numerical plasma simulations based on PIC-codes, and also numerical solutions of model equations for nonlinear high frequency plasma waves.
- Dr. Eduard Kontar, Department of Physics & Astronomy, University of Glasgow, UK. Expertise: plasma dynamics, in particular numerical studies of high frequency nonlinear plasma wave phenomena.
- Dr. Savino Longo, Chemistry dept. of the University and IMIP/CNR, Bari, Italy. Expertise: numerical models for collisional processes in fluids and plasmas, shock phenomena in particular.
- Prof. Einar Mjølhus, Institute of Mathematical Sciences, University of Tromsø, Norway. Expertise: nonlinear wave phenomena, theoretical studies of nonlinear low frequency, long wavelength Alfvén waves in plasmas, with particular attention to observations in the Earth's ionosphere.
- Prof. Hans L. Pécseli, Institute of Physics, University of Oslo, Norway. Expertise: theoretical studies of turbulence in plasmas and fluids. Signal analysis. Analytical studies of predator-prey encounters in turbulent flows.

- Cand.Scient. Peter Rippis, University of Oslo, Norway. Expertise: models and analytical studies of general relativity. Numerical modeling.
- Prof. Jan Trulsen, Institute of Theoretical Astrophysics, University of Oslo, Norway. Expertise: numerical and theoretical studies of turbulence in plasmas and fluids. Signal analysis. Analytical investigations of predator-prey encounters in turbulent flows.
- Prof. Andrzej W. Wernik, Space Research Center, Polish Academy of Sciences, Warsaw, Poland. Expertise: application of advanced methods for investigations of signals obtained by instrumented spacecrafts and numerical simulations, wavelet based methods in particular.

In addition we had several short term visitors, mostly from Nordic countries.

3. Workshops and seminars

3.1 Workshops

Two workshops were organized, both at the Lysebu Conference Center, near Oslo.

The first one “Third Nordic Symposium on Plasma Physics”, took place 4. – 7. October 2004. The meeting was the third in a series, first organized by H.L. Pécseli at the Risø National Laboratory in Roskilde, Denmark, 13. – 16. August 1985, and 8. – 12. August 1988, respectively. Altogether 28 papers were presented at Lysebu, by 30 participants.

The second workshop organized by the group was “International Cross Disciplinary Symposium on Physics and Biology”. It took place 4. – 7. March 2005 at Lysebu. The meeting had 29 contributions, presented by 31 participants.

3.2 Seminars

An openly announced talk on “Kinetic modelling of shock waves in gases including chemical reactions“, was presented by Dr. Savino Longo, 8. September 2004 at the CAS meeting room.

Altogether six CAS luncheon seminars were given by members of the group:

- Prof. Andrzej Wernik: “What is the Space Weather?” 13. October 2004.
- Prof. Hans Pécseli: “Turbulence in Nature: Why Should I Care?” 27. October 2004.
- Dr. Steinar Børve: “Numerical Approaches to Scientific Problems.” 23. February 2005.
- Prof. Jan Trulsen: “Turbulence in Plasma: What is Different from Turbulence in Fluids.” 16. March 2004.
- Prof. Einar Mjølhus: “Using the Ionosphere as a Laboratory for Plasma Turbulence.” 30. March 2005.
- Dr. Lars P. Dyrud: “Using Plasma Turbulence to Understand the Global Impact of Billions of Daily Meteors.” 20. April 2005.

4. Evaluation

The two workshops were considered to be very successful by the participants. The arrangement of the Plasma meeting will be continued, but in order to make certain that only novel results will be presented, the next meeting will be held in another Nordic country at least 3, rather 4 years from now. The second workshop was rather unique, by its cross disciplinary scope, in opening a platform for exchange of ideas between physicists and biologists, and it is likely that it will be continued by a different organization in Norway. Again, it is advisable to make the interval between the meetings at least 3 years.

The work at the Centre resulted in a number of publications and contributions at meetings and conferences, addressing the two central subjects for the activity:

- A. We studied predator-prey interactions with reference to aquatic microorganisms. Our results, based on analysis of data obtained by laboratory experiments and also numerical simulations, presumably represent the first quantitative estimate for testing certain model predictions. Existing models were generalized to become more realistic, and also these cases were amenable for tests by using the existing database. Some of the results may seem counterintuitive, but turn out to have simple physical explanations. We found the approach by comparing numerical simulations and laboratory experiments particularly fruitful in the studies related to the biological food chain. Significant advances were made

in the interpretation of the laboratory data as well as the results from the numerical simulations. Based on these studies, we are in a position to include the effects of the self induced motion of micro-organisms, and to make studies of systems coming close to realistic conditions in nature.

- B. Numerical codes were developed for analyzing the dynamics of plasmas, where collisions between charged particles and neutrals are sufficiently frequent to give significant effects for wave propagation and plasma stability. One example concerns the dynamics of small meteors (often of the size of a grain of sand, or smaller), that evaporates and subsequently becomes ionized by the friction with the Earth's neutral atmosphere. Significant progress was made on both topics, and we are now in a position to model, with great accuracy, the plasma surroundings of small meteors, and find good agreement with observations. The general numerical studies addressed also other methods. A novel main stream approach was tested out, the Smooth-Particle-Hydrodynamics (SPH) model, which has received great attention in recent years. In principle, this type of model can be applied for neutral flows as well as plasmas, but in the plasma case, they are considered most reliable for large scale structures. Several ionospheric problems were analyzed by numerical models, mostly small scale phenomena as those observed by instrumented space crafts in the Earth's near ionosphere. Significant progress has been made in the development of numerical codes on these topics, with results having value for our continuation of these projects.

5. Publications

5.1 *Refereed Journal Publications*

P. Guio and H. L. Pécseli, Phase space structures generated by an absorbing obstacle in streaming plasmas. *Ann. Geophysicae* 23, 853–865 (2005)

J. Berg Jørgensen, J. Mann, S. Ott, H. L. Pécseli, and J. Trulsen, Experimental studies of occupation and transit times in turbulent flows, *Phys. Fluids* 17, 035111 (2005)

E. P. Kontar and H. L. Pécseli, Nonlinear wave interactions as a model for naturally enhanced ion acoustic lines in the ionosphere. *Geophys.Res.Lett.* 32, L05110, 10.1029/2004GL022182 (2005)

S. Børve, M. Omang, and J. Trulsen, Regularized smoothed particle hydrodynamics with improved multi-resolution handling. *J. Comput. Phys.* 205, 345–367 (2005)

J. Mann, S. Ott, H. L. Pécseli, and J. Trulsen, Turbulent particle flux to a perfectly absorbing surface. *J. Fluid Mech.* 534, 1–21 (2005).

H.L. Pécseli, J. Trulsen, J. Mann and S. Ott, Predator-prey encounters in turbulent waters, *GLOBEC International Newsletter* 11, 25 (2005).

M. Omang, S. Børve, and J. Trulsen, SPH in spherical and cylindrical coordinates. Accepted for publication in *J. Comput. Phys.* (2005).

M. Omang, S. Børve, and J. Trulsen, Alternative kernel functions for Smoothed Particle Hydrodynamics in cylindrical geometry. Accepted for publication in *Shock Waves* (2005).

S. Børve, H. L. Pécseli, J. Trulsen, and S. Longo, Kinetic instabilities associated with injection of a plasma beam into a neutral background. *Physica Scripta*, accepted for publication (2005).

E. Mjølhus Velocity-amplitude relationships and polarizations in families of MHD solitary waves. *Physica Scripta*, accepted for publication (2005).

P. D. Rippis, Dynamics of radiation dominated branes: Vacuum dynamics from radiation. Submitted for *General Relativity and Gravitation* (2005).

E. P. Kontar and H. L. Pécseli, Naturally enhanced ion acoustic lines in the ionosphere, modeled by nonlinear wave interactions. Submitted (2005).

P. D. Rippis, H. L. Pécseli, and J. Trulsen, “Biased” random walks. To be submitted.

P. D. Rippis, A description of the new standard model of the universe in curvature coordinates. In preparation for Eur. J. Phys.

G. Boffetta, H.L. Pécseli, and J. Trulsen, Numerical studies of turbulent particle fluxes to perfectly absorbing surfaces. Submitted for publication (2005).

J. Mann, S. Ott, H. L. Pécseli, and J. Trulsen, Laboratory studies related to predator-prey encounters in turbulent waters: effects of changes in orientations and in fields of view. Submitted for publication (2005).

5.2 *Conference Proceedings*

J. Mann, S. Ott, H. L. Pécseli, and J. Trulsen, Turbulent particle flux to a perfectly absorbing surface, in *Advances in Turbulence X*, eds. H. I. Andersson & P.-Å. Krogstad, pp. 359–362. Proceeding from ETC10, the Tenth European Turbulence Conference, Trondheim, Norway, 29. June–2. July 2004.

J. Mann, S. Ott, H. L. Pécseli, and J. Trulsen, Predator-prey encounters studied as relative particle diffusion. In: *The Logistic Map and the Route to Chaos. From the Beginnings to Modern Applications*. Springer Complexity program. M. Ausloos and M. Dirickx, (Eds.) Springer (2005). Proceedings of the workshop “Verhulst 200 on chaos”, Royal Military Academy, Brussels, Belgium, 16.–18. September 2004.

H. L. Pécseli and J. Trulsen, Tests of time evolutions in deterministic models, by random sampling of space plasma phenomena. In: *Electromagnetic waves and radiation in geospace*. R.A. Treumann and J. LaBelle, (Eds.) Springer (2005). Proceedings of the Workshop on High Frequency Waves in Geospace, Ringberg Castle, Bavaria, Germany, 11.–14. July 2004.

S. Børve, M. Omang, and J. Trulsen, Simulating the Orszag-Tang vortex using RSPH.

Abstract Books and CD-ROM proceedings from XXI Int. Congress Theoretical and Applied Mech., Warsaw, Poland, 15.–21. August 2004.

H. L. Pécseli, S. Børve, J. Trulsen, and S. Longo. Kinetic instabilities associated with injection of a plasma beam into a neutral background. Proceedings (on CD) of the XXVII International Conference on Phenomena in Ionized Gases. Eindhoven, The Netherlands, 17.– 22. July 2005.

J. Trulsen, S. Børve, H. L. Pécseli, and S. Longo, Kinetic instabilities associated with injection of a plasma beam into a neutral background. Proceedings from URSI 2005, New Delhi, India, 22.–28. August 2005.

5.3 *Contributions at conferences and scientific meetings*

J. Mann, S. Ott, H. L. Pécseli, and J. Trulsen, Turbulent particle flux to a perfectly absorbing surface. ETC10, the Tenth European Turbulence Conference, Trondheim, Norway, 29. June–2. July 2004.

H. L. Pécseli, Phase space structures generated by an absorbing obstacle in a streaming plasma. (invited) Workshop on High Frequency Waves in Geospace, Ringberg Castle, Bavaria, Germany, 11.–14. July 2004.

H. L. Pécseli, Predator-prey encounters in turbulent waters; tests of models. (invited) “Verhulst 200 on chaos”, Royal Military Academy, Brussels, Belgium, 16.–18. September 2004.

H. L. Pécseli and J. Trulsen, Tests of deterministic models for time evolutions by random sampling of satellite data. 3rd Nordic Symposium on Plasma Physics, Lysebu, Oslo, Norway, 4.–7. October 2004.

J. Trulsen, H. L. Pécseli, and S. Longo, Particle-in-Cell (PIC) plasma simulations with charge exchange collisions. 3rd Nordic Symposium on Plasma Physics, Lysebu, Oslo, Norway, 4.–7. October 2004.

M. Omang, S. Børve, and J. Trulsen, SPH in spherical and cylindrical coordinates. SIAM SCE05, Orlando, Florida, USA, 12.–15. February 2005.

H. L. Pécseli, Concentrations and concentration fluctuations in a turbulent environment. Annual Meeting 2005 – ECOBE, ADAPT & CLIMAR. Norlandia Marsteinen Hotell, Sotra, Norway, 15.–16. February 2005.

H. L. Pécseli, J. Trulsen, J. Mann, and S. Ott, Predator-prey encounters in turbulent waters. International Cross-Disciplinary Symposium on Physics and Biology, Lysebu, Oslo, 4.–7. March 2005.

P. Rippis, H. L. Pécseli, and J. Trulsen, “Biased” random walks. International Cross-Disciplinary Symposium on Physics and Biology, Lysebu, Oslo, 4.–7. March 2005.

J. Trulsen, G. Boffetta, and H. L. Pécseli, Numerical modeling of predator-prey encounters in turbulent waters. International Cross-Disciplinary Symposium on Physics and Biology, Lysebu, Oslo, 4.–7. March 2005.

S. Børve, M. Omang, and J. Trulsen, Regularized Smoothed Particle Magnetohydrodynamics. Talk in connection with the IPAM program “Grand Challenge Problems in Computational Astrophysics”, UCLA, Los Angeles, USA, 3.–15. April 2005.

L. Dyrud, Modeling large aperture radar observations of meteors. EGU Meeting, Vienna, Austria, 24.–28. April 2005.

J. Trulsen, G. Boffetta, and H. L. Pécseli, Numerical simulations of predator-prey encounters in turbulent flows. ASLO Summer Meeting, Santiago de Compostela, Spain, 19.–24. June 2005.

L. Dyrud, S. Børve, H. L. Pécseli, and J. Trulsen, Modelling radar head echo observations. CEDAR meteor workshop, Santa Fe, USA, June 2005.

L. Dyrud, Using plasma turbulence to understand the global impact of billions of daily meteors. CEDAR Plenary Session, Santa Fe, USA, June 2005.

H. L. Pécseli, Studies of low-frequency electrostatic waves in the Earth's near ionosphere. (invited) Interrelation between plasma experiments in laboratory and space, IPELS05. Tromsø, Norway, 3.–8. July 2005.

H. L. Pécseli, S. Børve, J. Trulsen, and S. Longo. Kinetic instabilities associated with injection of a plasma beam into a neutral background. XXVII International Conference on Phenomena in Ionized Gases. Eindhoven, The Netherlands, 17.–22. July 2005.

J. Trulsen, S. Børve, H. L. Pécseli, and S. Longo, Kinetic instabilities associated with injection of a plasma beam into a neutral background. URSI 2005 conference, New Delhi, India, 22.–28. August 2005.

Linguistic Theory and Grammatical Change

Report by Jan Terje Faarlund
Group leader 2004/2005

1. General description

In all languages we can observe change over time. Such changes may have identifiable external causes, but those usually explain only why a process of change started at some point. In order to explain why the outcome of the change is as it is we need theories of grammar and internal linguistic structure.

The goal of the project on Linguistic Theory and Grammatical Change was to discuss and test out hypotheses about language internal conditions and causes of grammatical change over time, and thus formulate new theories of language change. This was done on the basis of empirical data from a variety of languages, and recent linguistic theory. The project concentrated on identifying principles and mechanisms which underlie syntactic change.

Each of the fellows contributed towards this effort by presenting their work, ideas, analyses and hypotheses to the other group members for discussion. Discussions might be concerned with the data and its interpretation, but more often about the analyses of it and the underlying theoretical assumptions. These discussions were often driven by the different language material presented, and by the different linguistic schools of thought represented within the group.

One central topic which came up repeatedly in our discussions, was the notion of *grammaticalization*, which means that there is a general tendency in language change for various elements to become more 'grammatical'; content words become grammatical words (*going to* > *gonna* 'future tense'), full words become clitics (*I will* > *I'll*), clitics become affixes (Old Norse *hestr+inn* > *hesten*), etc. The reverse development is very rare, and the question is whether this common and almost unidirectional drift in languages is due to a property of language itself, or whether it follows from other principles of language acquisition and use. This question is closely related to notion of *reanalysis* in connection with first language acquisition. The group

members arrived at CAS with quite diverging approaches to these questions, and this triggered theoretically important discussions in the group. Speaking for myself as a group leader, I have a feeling that through these discussions in our group, we reached, if not a consensus, at least a deeper understanding of the theoretical and empirical problems involved and of the approaches that can be made within the various theoretical frameworks.

The group met regularly for presentations and discussion of work in progress once or twice a week, depending on the number of fellows present at any given time, and on the stage of the work of each member. Because of the very favourable design of the physical space at CAS, the discussions within the group could also take place informally on a daily basis. The group also functioned very well socially, sometimes meeting for dinner or a beer after work, and even going on trips and excursions, including one combined work and sightseeing excursion to Røros in the autumn.

Part of our work will be published in a volume from the Rosendal symposium (see below) edited by Thórhallur Eythórsson. But most of it will be published separately in journals. (Cf. the lists of publications under each fellow below.)

The working conditions at CAS are excellent, and yield the best possible conditions for performing the kind of activities which the Centre is meant for. We all benefited tremendously from this year, and I can safely say that the objective of enhancing the level of basic research in Norway (and elsewhere) was certainly achieved, in that we all came out of this stay with new inspiration, new insights and fruitful ideas.

2. Fellows

Our group consisted of a total of nine fellows, four from Norway (all from the University of Oslo), three from the United States, and one each from Denmark and Iceland. The fellows covered a wide range of language expertise (Germanic, Romance, Slavic, classical languages, Indo-European, South and East Caucasian, native American languages) and different theoretical approaches. One great advantage of this group was its stability: four of the fellows spent the entire year at CAS. One spent one full semester, one stayed for three months, and two for two months each.

The fellows were:

- Professor Henning Andersen, UCLA (one year)
- Professor John Ole Askedal, Oslo (one year)
- Dr. Thórhallur Eythórsson, Reykjavik (one year)
- Professor Jan Terje Faarlund, Oslo (group leader, one year)
- Professor Elly van Gelderen, Arizona State University (one semester)
- Professor Alice C. Harris, SUNY Stony Brook (two months)
- Dr. Dag Haug, Oslo (three months)
- Professor Kjartan Ottosson, Oslo (one year)
- Professor Lene Schøsler, Copenhagen (two months)

3. Symposia

3.1 *Mellomskandinavisk språk og filologi (Middle Scandinavian language and philology) Vitenskapsakademiet, Oslo, April 1 – 2, 2005.*

This symposium was organized by Kjartan Ottosson in collaboration with Karl-Gunnar Johansson at the University of Oslo. The following papers were read:

- Britta Orlík Frederiksen, København: “Udgivelse af danske og svenske tekster fra senmiddelalderen: status og opgaver for fremtiden”
- Patrik Åström, Stockholm: “Katalogisering av svenska och danska handskrift-er från medeltiden: nuläge och framtidsutsikter”
- Jonas Carlquist, Umeå: “Att edera och analysera en bordsläsningshandskrift”
- Lars-Olof Delsing, Lund: “Kasussammanfallet och dess konsekvenser”
- Kurt Braunmüller, Hamburg: “Strukturer til venstre for C i ældre danske og svenske tekster”
- David Håkansson, Lund: “Framväxten av subjektstvång i yngre fornsvenska. En orsak till andra syntaktiska förändringar?”
- Endre Mørck, Tromsø: “V1-leddstilling i mellomnorske heilsetninger”
- Lars Wollin, Åbo: “Textproduktion, översättning och genrer i svensk och nordisk medeltid”
- Rakel Johnson, Göteborg: “Myten om medeltidslagarna. Presentation av ett projekt kring lex, kodex och praxis 1300–1600”
- Gisela Vilhelmsdotter, Stockholm: “Källtext, målttext och social context”

- Kjartan Ottosson, Oslo: “Noregs deltaking i det språklege og litterære fellesskapet i skandinavisk seinmellomalder”
- Ingela Hedström, Oslo: “Den tryckta tideboken och dess (möjliga) handskrivna förlagor”
- Nils Dverstorp, Oslo: “Vadstenastil – en diskussion om paleografisk klassificering”

3.2 *Linguistic Theory and Grammatical Change* (“*The Rosendal Symposium*”)

Rosendal, June 1 – 3, 2005.

This was a closed meeting, consisting of our nine fellows plus an additional eleven invited participants from various countries. The following papers were read:

- Martin Maiden, Oxford: “Lexical nonsense and morphological sense: on the real importance of ‘folk etymology’ for historical linguists”
- Alice C. Harris, SUNY Stony Brook & CAS, Oslo: “Explaining Exuberant Agreement”
- Keren Rice, Toronto: “On incorporation in Athapaskan languages: aspects of language change”
- Marianne Mithun, UC Santa Barbara: “How stable are argument categories?”
- Ulrich Detges, Munich: “Two types of reanalysis”
- Lene Schøsler, Copenhagen & CAS, Oslo: “The status of valency”
- Ioanna Sitaridou, Cambridge: “Against competing grammars: evidence from learned constructions”
- Hans-Olav Enger, Stavanger: “Grammaticalisation due to homonymy avoidance?”
- Ans van Kemenade, Nijmegen: “Discourse adverbs and clausal syntax in Old and Middle English”
- Elly van Gelderen, Arizona State University & CAS, Oslo: “Linguistic Cycles and Economy”
- Kjartan Ottosson, Oslo & CAS, Oslo: “The Diffusion of System-Defining Changes through the Inflectional System: Evidence from Nordic and other Germanic Languages”
- Christer Platzack, Lund: “Left Branch Extraction of Adjectives in Old Icelandic”
- Þórhallur Eythórsson, Reykjavik & CAS, Oslo: “The New Passive in Icelandic: Merge over Move”
- John Whitman, Cornell: “The Evolution of English Complement *for NP to*”

- Ulrike Demske, Saarland: “Infinitival Complementation in Old High German”
- Michela Cennamo, Naples: “The rise and development of analytic perfects in Italo-Romance”
- Dag Haug, Oslo & CAS, Oslo: “Resultatives to Anteriors: irregularity in semantic change?”
- Henning Andersen, UCLA & CAS, Oslo: “Grammaticalization in a speaker-oriented theory of change”
- John Ole Askedal, Oslo & CAS, Oslo: “‘Degrammaticalization’ versus typology. Reflections on a strained relationship”
- Jan Terje Faarlund, Oslo & CAS, Oslo: “A mentalist interpretation of grammaticalization theory”

The meeting was a great success, academically, socially and gastronomically!
Here is a sample of the response from external participants:

MANY HEARTFELT THANKS for the most interesting, well-organised symposium I have ever been and foremost for the opportunity to be there!

See you soon,
Ioanna

It is difficult to know how to ever thank you for inviting me to the conference last week – it was truly an experience of a lifetime, and I felt truly honoured to be included in it. I learned a tremendous amount from listening to presentations and talking with people, and had a wonderful time. I cannot imagine that I will ever be treated so well again in my life!

All the best,
Keren

Most of the participants at Rosendal will meet again in Oslo in December 2005 to discuss revised versions of their papers, which will then be published in a volume edited by Thórhallur Eythórsson.

4. Research activities and publications

In the following we list the activities of each individual fellow, and the publications and presentations they have resulted in – or will result in.

Contributions to the Rosendal symposium and to the volume from that symposium, are specified above, and are not included here. Nor are the contributions to the CAS publication *Synergies* listed here.

Henning Andersen

is a specialist on Slavic languages and theory of linguistic change. At CAS he concentrated on two subprojects: quantifiers in Slavic, and the origins and development of the future tense in the Slavic languages.

Publications:

- Review of *The Handbook of Historical Linguistics* ed. by Brian D. Joseph and Richard D. Janda. *Diachronica* 22.155–175.
- Some thoughts on the history of Russian numeral syntax. Accepted for publication in *Festschrift for NN*.
- Leveling in paradigms. Possibility, impossibility, and contingency. Accepted for publication in *Festschrift for NN*.
- The last days of the Russian future perfect. Accepted for publication in *Festschrift for NN*.
- Review of *Examining the farming/language dispersal hypothesis* ed. by Peter Bellwood and Colin Renfrew. Accepted for publication in *Journal of Indo-European Studies*.
- Future and Future Perfect in the Old Novgorod Dialect. Accepted for publication in *Russian Linguistics*.

Work in progress:

- Slavic futures. Paper read at a conference on grammaticalization in Copenhagen, 2.12.2004.
- Grammaton, regrammaton, and degrammaton. Tense loss in Russian. Paper read at the XVII. International Conference on Historical Linguistics, Madison WI, 01–05.08.05.
- Grammatical indexes, with special reference to morphophonemics. For a chapter in E. Cyran & E. Gussmann (eds.) *Evidence of morphophonology*.
- Grammaticalization in a speaker-oriented theory of change.

Conference participation:

- Language Change and Explanatory Models, Copenhagen 2004.12.02
Plenary talk: Slavic futures: history and geography
- *Norsk-dansk symposium om grammatikalisering*, Sophienberg 2–6 januar 2006: The grammar of indexes.

- *XVII. International Conference on Historical Linguistics*, Madison WI, 31.07 – 05.08.2005: Grammatization, regrammatization, and degrammatization. Tense loss in Russian.

Lecture:

- Fra universalgrammatikkens grænseland. University of Oslo 2004.11.17

John Ole Askedal

is a specialist on German syntax and comparative Germanic linguistics. At CAS, he worked especially on aspects of syntactic change in German, and on theoretical problems related to grammaticalization, with regard to the history of German, as well as generally. For half of the term at CAS, Askedal held the very important position as editor of *Norsk Lingvistisk Tidsskrift*.

Publication:

- Grammatikalisierung und Persistenz im deutschen “Rezipienten-Passiv” mit *bekommen / kriegen / erhalten.* *Grammatikalisierung im Deutschen*, ed. by Torsten Leuschner, Tanja Mortelmans og Sarah De Groot, 211–228. Berlin – New York: Walter de Gruyter (Linguistik – Impulse und Tendenzen 9).

Work in progress:

- Syntaktische und Wortbildungsmittel: Interkategoriale Koordination von Adjektiv und Erstelement eines Kompositums im gegenwärtigen Deutsch im Vergleich mit dem Norwegischen und dem Englischen.
- Kasus im Mittelniederdeutschen und Festlandskandinavischen. Typologische Überlegungen zu einer germanischen Sprachkontaktfrage.
- Überlegungen zur morphosyntaktischen Entwicklung des Germanischen.
- Das Passiv im Deutschen und anderen germanischen Sprachen – aus typologischer und historischer Sicht.
- Arealtypologische Studien zu en germanischen Sprachen. (Planned as monography)
- The Syntagmatic and Paradigmatic Patterning of Modality in Modern German.
- Some General Grammatical Differences between the Modern Germanic Languages with a View to Language History.
- General Grammatical Differences between the Modern Germanic Languages in a Historical and Typological Perspective.
- Regrammatikalisierung im Deutschen. Begriffliche Erläuterung und zwei empirische Beispiele.
- (with Lene Schøsler): ‘Moveable’ *re-* etc. in Medieval and Modern Romance.

- Typologisk restrukturering og grammatikalisering. En diskusjon av noen eksempler fra fastlandsskandinavisk

Conference organization:

- *Central Research Problems in Connection with the Older Runes*, The Norwegian Academy of Science and Letters, Oslo, 03.–04.09.2004, in collaboration with James E. Knirk and Terje Spurkland.

Conference participation:

- *Das Deutsche als Forschungsobjekt und als Studienfach. Synchronie – Diachronie – Sprachkontrast – Glottodidaktik*. Internationale Fachtagung anlässlich des 30. Jahrestages der Germanistik in Zielona Góra, Zielona Góra/Grünberg, Polen, 14.–16.10. In the section “Historische Sprachwissenschaft des Deutschen / Sprachkontakte”: Mittelniederdeutsch und Skandinavisch – Sprachkontakt aus typologischer Sicht.
- *Language History and Language Contact on the North-Sea Littoral*. An International Symposium organized by the *Institute of Language and Communication, Sproghistoriekredsen* and *Dansk Forum for Sproghistorie*, Syddansk Universitet, Odense, 4.–5.11.
- ‘Degrammaticalization’, ‘halted grammaticalization’ and ‘retraction’ in the history of German. A discussion of some putative examples with a view to language-specific prototypicality. *New Reflections on Grammaticalization 3* (NRG 3), Santiago de Compostela, 17.–20.07.2005.
- Reflections on the Grammatical Status and Historical Development of the German Logophoric Subjunctive. *XVII. International Conference on Historical Linguistics*, Madison, Wisconsin, 31.07.–05.08.2005.
- Sprachplanerische Zugriffe auf das Norwegische im 20. Jahrhundert. Ideologische Motivation und praktische Ergebnisse. *XI. Weltkongress der Internationalen Vereinigung für Germanistik*, Sorbonne, Paris, 26.08.–03.09.2005.

Pórrallur Eypórsson

is a specialist on Icelandic and the oldest attested varieties of Germanic. At CAS he was able to complete several works that he had already been planning, as well as start new projects.

Eypórsson will be the editor of the volume containing the papers from the Rosendal/Lysebu symposium to be published by John Benjamins.

Publications:

- The chapter on ‘Norse and Icelandic’ for the *Encyclopedia of Languages and Linguistics*, 2nd ed. by Keith Brown
- (with Johanna Barðdal:) one paper accepted by *Language*.
- (with Johanna Barðdal:) one paper accepted for an edited John Benjamins volume.
- (with Johanna Barðdal:) one paper accepted by *Working Papers in Scandinavian Syntax*.
- (with Jóhannes Gísli Jónsson:) Variation in case marking in Icelandic. *Nordic Journal of Linguistics*.

Work in progress:

- *Grammar of the Older Runic Inscriptions*, esp. the syntax part (a book project).
- An article on the phonology-syntax interface with evidence from stress in compound verbs in Old Irish
- An article on the status and origin of the “new passive” in Icelandic
- An article tentatively entitled ‘More or less regular: oblique case in Insular Scandinavian’ (with J.G. Jonsson).

Conference participation:

- The annual meeting of the Linguistic Society of America, Oakland, CA, January 6–9, 2005: The stress of compound verbs in Old Irish.
- The annual Rask Conference in Iceland, January 22, 2005: Variation in case marking in Icelandic.
- Deutsche Gesellschaft für Sprachwissenschaft (DGfS) in Köln in the end of February (workshop on exceptions in linguistics): Exceptional patterns in case marking.
- Grammatik i Fokus, in Lund in March 2005: The new passive in Icelandic.
- *XVII. International Conference on Historical Linguistics*, Madison, Wisconsin, 31.07.–05.08.2005: Case marking in Icelandic and Faroese (with J.G. Jonsson).

Lectures:

- Two talks at the University of Bergen in late October (on runic syntax and Germanic oblique subjects).

Jan Terje Faarlund

is a specialist on the Scandinavian languages, and has in particular been working on the history of Scandinavian syntax and on the theory of syntactic change. He is also working on the native Mexican language Zoque.

During the year at CAS I worked mainly on three different topics: 1) Diachronic Scandinavian syntax, finishing and submitting a couple of papers on syntactic phenomena in the history of Norwegian. 2) Variation and change in the grammar of Zoque, a Mesoamerican language which I have been working on for many years. I also had the chance to visit Mexico once during this year to collect further data on dialect variation. 3) Grammaticalization theory, where I have argued that this theory of grammatical change should be replaced by a theory based on language acquisition and on the mental representation of language.

Publications:

- From clitic to affix: on the history of Scandinavian reflexive verbs. *NOWELE* 2005, 53–72.
- Review of Olga Fischer, Muriel Norde and Harry Peridon (red.): *Up and down the Cline – The Nature of Grammaticalization*. To appear in *Language*.
- Parameterization and change in non-finite complementation. Submitted to *Diachronica*.
- (with Alice Harris) Trapped Morphology, presented at the symposium *Weak Words*. Submitted to the *Journal of Linguistics* on 25 July 2005

Work in progress:

- The reanalysis of focus constructions in Chiapas Zoque.
- A mentalist interpretation of grammaticalization theory.

Conference participation:

- *Weak Words: their origins and progress*. Konstanz, Germany: with Alice Harris: *Trapped Morphology*.
- *XVII. International Conference on Historical Linguistics*, Madison, Wisconsin, 31.07.–05.08.2005. Two papers presented: A mentalist interpretation of grammaticalization theory; The reanalysis of focus constructions in Chiapas Zoque.

Lectures:

- Randse Afrikaanse Universiteit, Johannesburg, South Africa: The bilingual situation in Norway and problems of standardization. August 2004.

- Seminar on Theoretical Linguistics, University of Oslo: Grammaticalisingsteori møter generativ grammatikk.
- Center for Advanced Study in Theoretical Linguistics (CASTL), Tromsø: A mentalist interpretation of grammaticalization theory. February 2005.

Elly van Gelderen

is a specialist on the history of English grammar. She is particularly well known for her analyses of the syntax of Old and Middle English within the framework of generative grammar.

Publications:

- Aspectual Prefixes in English and Dutch. Submitted to *Studia Linguistica*.
- Interface Conditions and Code Switching: Pronouns, lexical DPs, and Checking. Accepted by *Lingua*.
- Structures behind Grammaticalization. For the proceedings of the *Diachronic Generative Syntax* conference at Yale 2004.
- Accelerated Grammaticalization in the *Peterborough Chronicle*. Submitted to a special volume on The Peterborough Chronicle.

Work in progress:

- Started work on a new book, *Linguistic Cycles*, and worked on that throughout her stay.
- Work on chapter 8 of the book *A History of the English Language*.

Alice Harris

is a specialist on languages of the Caucasus, having published extensively on Georgian and other Kartvelian languages, as well as on languages belonging to other language families of the Caucasus.

Her goal while at the Centre was to work on her book on morphological change in cross-linguistic perspective. She did do considerable reading on some of the topics to be treated, including markedness, analogy, and changes in morpheme order. In addition, she had the time to re-think some of the topics she had planned for the book and to make notes on these. She also became interested in a number of other issues in diachronic morphology and pursued these, as one led to another. While at CAS, she did quite a bit of reading and background research on Andi, languages of its subgroup and languages of the most closely related subgroup in preparation for writing an article on reconstructing one declension in Andi. This paper will be presented at the Spring

Workshop on Reconstruction, University of Michigan, 2006. During the time she spent at the Centre, she also conceived two long-range research projects, which may or may not go anywhere. The first is a continuation of a topic on which she has now written two papers, the explanation of the typological rarity of certain phenomena. The second long-range project that she conceived while at the Centre involves the interaction of subject and object agreement markers or subject and object clitics.

Publications:

- (with Jan Terje Faarlund) Trapped Morphology, presented at the symposium *Weak Words*. Submitted to the *Journal of Linguistics* on 25 July 2005
- Origins of Differential Unaccusative/Unergative Case Marking: Implications for Innateness, *Festschrift for David Perlmutter*, ed. by Donna Gerds, John Moore, and Maria Polinsky. Cambridge: MIT Press. In press. [Previously written; revised while at CAS.]

Work in progress:

- The Role of Referral in Languages of the Caucasus. [Begun at CAS. She hopes to present this paper and to submit it for publication within 2006.]
- An untitled paper reconstructing one declension in Andi. [To be presented at the Spring Workshop on Reconstruction; writing has not yet begun.]

Conference participation:

- Weak Words: their origins and progress. Konstanz, Germany: with Jan Terje Faarlund: Trapped Morphology.

Dag Haug

is a specialist on classical languages, with an interest in Indo-European and general linguistics, and in particular the semantics of verbal categories.

Publication:

- Biographical articles for the *Encyclopedia of Language and Linguistics*.

Work in progress:

- Tense and Aspect from Proto-Indo-European to Latin.
- The interaction of verbal prefixation and morphological aspect marking, and the semantics of verbs with a perfective prefix and imperfective aspect.
- The prefix *co(n)-* and grammaticalization theory.
- Starting work on verbal prefixation and information structure.

Conference participation:

- *Greek and Latin from an Indo-European Perspective*, Cambridge University, July 6 – 9, 2005: The history of Latin *com-*.
- *XVII. International Conference on Historical Linguistics*, Madison, Wisconsin, 31.07.–05.08.2005: Building a conjugation: The creation of the Latin verbal system.

Kjartan Ottosson

is a specialist on Norse philology and Icelandic linguistics, especially historical morphology.

His main project is concerned with the spread of changes in the inflectional morphology through the grammatical system. He made in-depth study of the loss of person agreement in Swedish verbs, which he could then compare to the same kind of changes in Norwegian, which he has already studied. He has also spent quite a bit of time on questions concerning cliticization and grammaticalization in mediopassives in Old Norse and Ancient Nordic. From there on he is going on to reconstruct the Ancient Nordic mediopassive in a comparative Germanic perspective. Furthermore he has been reconsidering general problems of explanation in historical linguistics, the distinction between innovation and spread, and the role of structural and social factors.

Publications:

- (with Joan Maling): Review article on Markus Steinbach: *The Middle Voice. A comparative study in the syntax-semantics interface of German.* (Linguistik Aktuell/Linguistics Today 50). Forthcoming in *Journal of Linguistics*.
- *The Old Nordic Middle Voice: Questions of cliticisation and grammaticalisation.* Submitted for publication in the proceedings of a colloquium on *Diachronic Typology in Göteborg* 19 – 21 November 2004.

Work in progress:

- *The Diffusion of Systemic Changes through the Inflectional System: Evidence from Nordic Languages and German.*
- *The Proto-Nordic Middle Voice in its Germanic Context.*
- *Personböying av verb i mellomsvensk.*
- *Den såkalla birgittinarnorsken.* Article based on parts of the talk 'Noregs deltaking i det nordiske språk- og litteraturfellesskapet i skandinavisk seinmellomalder'.
- *The Syntax and Semantics of the Middle Voice in Classical Old Norse.*

- Mediopassiv i dei eldste skaldedikta og eddadikta.

(Bright) ideas for future work:

- Extension of the research programme set forth in ‘The Diffusion of Systemic Changes through the Inflectional System’ to more changes in more languages.
- Further work on ‘The Hidden Mechanisms of Language Change’ with special regard to the interaction of social factors with naturalness and saliency of linguistic features.

Conference organization:

- *Mellomskandinavisk språk og filologi*, Vitenskapsakademiet i Oslo, April 1–2 2005. Symposium sponsored by the Centre for Advanced Study. Initiator and organiser with Karl G. Johansson. Keynote talk: Noregs deltaking i det nordiske språk- og litteraturfellesskapet i skandinavisk seinmellomalder.

Conference participation

- *Linguistic Society of America: 79th Annual Meeting*, Oakland, 6–9 January, 2005.
- *27. Jahrestagung der Deutschen Gesellschaft für Sprachwissenschaft: (In)determinismus in der Sprache*, Cologne, February 23. – 25.2005.
- *Central Research Problems in Connection with the Older Runes*, The Norwegian Academy of Science and Letters, Oslo, 03.– 04.09.2004.
- *Language typology in a diachronical perspective*, Colloquium organised by Institutionen för romanska språk and Institutionen för slaviska språk, Göteborgs universitet (a cooperation Göteborg-Oslo-Århus), Göteborg November 19th–21st, 2004. Invited paper: The Old Nordic Middle Voice: questions of cliticisation and grammaticalisation.
- *Demoting the agent: Passive and Other Voice-Related Phenomena – Workshop* at the University of Oslo, November 25–27 2004.

Presentation of work from the project to an external audience:

- Seminar on Theoretical Linguistics, University of Oslo: Grammatikaliseringsteori møter norrøn mediopassiv. April 2005.

Lene Schøsler

is a specialist on historical French syntax and Romance linguistics.

Publications:

- L'évolution des constructions à verbes supports illustrée par le cas de *conseil* comme noyau prédicatif. (For a Festschrift)
- The status of valency patterns. For a book on valency to be published by de Gruyter in Germany.
- Vivre ça me fout la trouille. Mourir plus encore, mais vivre ça me fait vraiment peur. A diachronic perspective on support verb constructions. To be published by Peter Lang in Germany.
- Review of Pierre Larrivée: *L'association Négative. Depuis la syntaxe jusqu'à l'interprétation.*

Work in progress:

- (with John Ole Askedal): 'Moveable' *re-* etc. in Medieval and Modern Romance.

Attention-Deficit/Hyperactivity Disorder (ADHD)

from Genes to Therapy

Report by Terje Sagvolden
Group leader 2004–2005

1. General description

Attention-Deficit/Hyperactivity Disorder (ADHD) [1] is a seemingly heterogeneous group of cognitive/behavioural developmental disorders where all clinical criteria are behavioural. ADHD affects between 2% and 12% of grade-school children [2–5]. The disorder usually, but not always, manifests itself before the child is 7 years old [6,7]. Of children diagnosed with ADHD, 50–70% will have problems related to social adjustment and functioning, and/or psychiatric problems as adolescents and young adults [8,9].

The primary aim of the ADHD group at the Norwegian Centre for Advanced Study was to combine behavioural and neuroscientific basic research on Attention-Deficit/Hyperactivity Disorder (ADHD). The group represented the first, broad interdisciplinary collaboration between clinical researchers and basic researchers on ADHD anywhere in the world. The international interdisciplinary group had as its major objective to try to reach a thorough understanding of ADHD. To a large extent this was obtained. All participants contributed to the new ways of looking upon ADHD.

Scientific progress. The group obtained more than it was reason to expect in advance. Part of the reason for this is the high quality of the group members, the fact that most of them were able to spend several months at CAS, and the careful, long-term planning (about 2 years) before the group gathered for the first meeting.

The discussions of the ADHD group had a review article in a prestigious, high-impact journal as the background: Sagvolden, Johansen, Aase, & Russell (2005) [10]. (The dynamic developmental theory is abbreviated DDT below.) Highlights of the main proceedings of the group were published in the same journal: Johansen, Sagvolden, Aase, & Russell (2005) [11] as well as in several

other articles (see publication list). The insights will be developed further in review articles co-authored by most of the CAS members. Manuscripts are now drafted and we will meet in Valencia and Tromsø later this year for finishing manuscripts and developing more collaborative research projects. The main aim of this effort is further to strengthen basic research in Norway as stated in the overall goal of CAS.

The advances made during this year would have been very difficult to obtain without researcher with a wide range of relevant backgrounds being gathered at a centre like CAS. Our new insights are now published in international journals and meetings. The new insights into ADHD will most likely form the basis not only for future diagnosis and treatment of ADHD, but also for the design of future studies on animal and mathematical models that will be helpful in advancing the understanding of ADHD even further. Examples of this are the new models developed for understanding the altered dynamics of ADHD behaviour, both in children [12] and in the animal model. Thus, it is to be expected that insights generated by an ADHD group at the Norwegian Centre for Advanced Study will have a large impact on future international ADHD research.

2. Participants

The group was composed so that relevant interdisciplinary research areas were represented virtually at all time.

- Terje Sagvolden (group leader), Professor, Institute of Basic Medical Sciences, University of Oslo, Norway
- Judith Auerbach, Professor, Department of Behavioral Sciences, Ben-Gurion University, Israel
- Tobias Banaschewski, Dr. med., Clinic and Policlinic of Child & Adolescent Psychiatry, University of Göttingen, Germany
- Edmund Sonuga Barke, Professor, School of Psychology, University of Southampton, UK
- David Berger, Professor, Department of Psychology, State University of NY College at Cortland, USA
- Espen Borgå Johansen, Research fellow, Institute of Basic Medical Sciences, University of Oslo, Norway
- Peter Killeen, Professor, Dept. of Psychology, Arizona State University, USA

- Anneke Meyer, Professor, Department of Psychology, University of Limpopo, South Africa
- Robert Oades, Professor, Clinic for Child and Adolescent Psychiatry and Psychotherapy, University of Essen, Germany
- Vivienne Russell, Professor, Department of Human Biology, University of Cape Town, South Africa
- Rosemary Tannock, Professor, Department of Psychiatry, University of Toronto, Canada
- Gail Tripp, Dr., Department of Psychology, University of Otago, New Zealand
- Jeff Wickens, Professor, Department of Anatomy and Structural Biology, University of Otago, New Zealand
- Jonathan Williams, Dr. Institute of Psychiatry, University of London, UK
- Heidi Aase, Research fellow, Norwegian Centre for the studies of Conduct Problems and Innovative Practice Ltd, Norway.

3. Main achievements

As promised in the original application, the ADHD group worked on neuro-biological data and insights that may bridge the present genetic and behavioural (clinical) evidence. The point of departure in the discussions and theory building was the neurobiology of the dopamine and glutamate systems, in particular the roles these systems play in neuronal plasticity, learning, and memory underpinning behavioural functions. The heterogeneous background of the group participants made possible the major advances in understanding some of the interactions involved. The insights form the main body of the application to the Norwegian Research Council submitted Sept 1st this year for funds for basic research on ADHD at the University of Oslo.

ADHD is a behavioural disorder with no established biological marker. We wanted to explore the extent to which ADHD symptomatology could be described and explained by a limited set of assumptions. Realizing the diversity of findings, it is unlikely that they can all be explained by a single theory.

In ADHD research, a major discussion has been whether ADHD symptoms should be regarded as extremes of normal distributions (“dimensional”) rather than qualitatively different from normality (“categorical”). The group consensus is that a dimensional approach is more appropriate. The dynamic developmental theory (DDT) has a dimensional approach to ADHD. It

explains seemingly unrelated behavioural symptoms within the same theoretical framework. The DDT explains how levels of hyperactivity and impulsivity may depend on changes in basic learning mechanisms in ADHD and how the behavioural symptoms will be dimensionally related to the shapes of individual delay-of-reinforcement gradients in ADHD.

There is now general agreement that ADHD involves altered sensitivity to reinforcers (reward). A major achievement of the group is the realization that delay gradients results from pairing the reinforcer with the fading of precursors, for example, the fading of memory traces of the behaviour. Looking on delay gradients as expressions of underlying memory processes introduces novel perspectives into the DDT. Altering short-term or working memory of events may change effects of delayed reinforcers by increasing memorability of these events when the reinforcer is delivered. We now see how it will be possible to test this experimentally and how to investigate if this is related to a hypofunctioning dopamine system.

The DDT predicts that, at least early in training, there will be fewer units in a chain of behaviour in ADHD than normally. The slower acquisition of long behavioural chains will give rise to variable, less orderly behaviour that might appear impulsive. When we had worked out the underlying mathematics early this spring, we started to analyze data collected with children in Norway and South Africa as well as with the validated animal model. The first of these publications is already published [12], more will be submitted this autumn. This is a major achievement with a substantial potential for designing new diagnostic instruments that may be used across cultures and languages. It might also explain why ADHD is associated with language problems which typically involve sentences with many behavioural elements.

Attention is poorly defined and difficult to understand, even in a disorder named Attention Deficit Disorder. The explanation of inattention (poorer stimulus control), in terms of a steepened delay gradient (faster decay of the memory trace left by the onset of the stimulus), is an important aspect of the DDT. This theory points out that the reinforcing value of the conditional stimulus decays by time from the onset of this stimulus to the delivery of the reinforcer.

The DDT describes how the same etiological factor, changes in basic learning mechanisms, may produce a wide range of symptoms or behaviours depending on how these initial changes interact with the environment.

At the start of the ADHD group, it was suspected that alternative theories like the Temporal Difference model of Peter Dayan [13], or the Dual-Process theory of Edmund Sonuga-Barke [14] would offer interesting alternatives. The work of the ADHD group has shown that alternative theories have much less explanatory power than the DDT. The former by lack of formal behavioural predictions. The latter by relying on underlying factors that are difficult to test experimentally.

The DDT as further developed by the ADHD group at CAS, offers plausible explanations of a large number of ADHD behaviours both from a purely behavioural point of view and from a neurobiological (hypodopaminergic) point of view. Important areas for future studies include the relationship between reinforcement decay functions and memory, and between motor functions and timing in ADHD, as well as how initial neurobiological changes in ADHD affect long-term development. Also, advances in neuroscience will produce more precise knowledge about the neurobiological changes in ADHD. These insights will offer a more solid understanding of how altered neurobiological functions interacting with environmental factors produce ADHD symptoms. We did not reach any conclusion on whether the hyperactive-impulsive and inattentive subtypes of ADHD are separate subgroups or may be explained as different outcomes of the same genetics and thus explained by the same principles.

4. Meetings

At the *CAS Opening Meeting* 8th – 14th August 2004 at Soria Moria, the 30 participants presented their most recent research and ideas relevant to this project. Some of the participants came from outside of the ADHD research field. They were not members of the CAS group, but presented relevant topics from basic research normally not covered in conferences on ADHD. Examples are Allen Neuringer's presentation "*Varieties of variability*" and Jan G. Bjålie's "*Functions of the cerebellum: Who should we believe?*" Lectures like these highlighted central topics in ADHD, variability and sensory functions, respectively. The lectures and discussions were very successful; hardly any

participant missed a lecture although the meeting started at 830 in the morning and ended shortly before dinner! <http://www.cas.uio.no/Groups/0405ADHD/Kickoff.html>

The group organized the annual meeting of the *European Research Network of Hyperkinetic Disorders* (EUNETHYDIS), September 30th to October 3rd at Soria Moria. Participants were 55 ADHD researchers from Europe and the USA. The presentations were highly relevant to the CAS group's discussions. This meeting was funded by pharmaceutical industry and represented valuable input to the group's discussions with no extra costs. The CAS group will have two symposia and a plenary lecture at this year's EUNETHYDIS meeting taking place in *Valencia, October 7th–9th*. The CAS group will use this opportunity to meet a few days early and work on two joint review articles.

We transmitted insights from our research to Norwegian clinicians and others working with people with ADHD by organizing four meetings at CAS: *ADHD Forum – møter for fagfolk som arbeider med ADHD*. The program was: February 24th 2005: Rosemary Tannock – *Socioeconomic impact of ADHD*; March 31st 2005: Heidi Aase – *Læringsmekanismer i ADHD og betydning for tiltak*; April 21st 2005: Judith Auerbach and Rosemary Tannock – *Problems in Preschool Children*; and, May 12th: Terje Sagvolden – *Nevrobiologiske faktorer i ADHD*. All meetings were well attended by more than 50 participants working in the clinics, schools, prisons, private practice, etc. <http://www.cas.uio.no/Groups/0405ADHD/ADHDforum.html>

We will organize the concluding meeting of the ADHD group at CAS in Tromsø, December 12th – 17th. The main objective of this meeting is to formulate testable scientific problems and design studies based on the proceedings of the group and the application to the Research Council of Norway for funds to the establishment of a Norwegian Centre for Basic Research on ADHD at the University of Oslo. This will be the ultimate way of using our year at CAS for strengthening basic research in Norway.

5. Public relations

The group leader gave the public lecture at the opening of the Academic Year 2004–2005 at CAS: *Attention-Deficit/Hyperactivity Disorder (ADHD) – the Plague of Our Time?*

During the 2005 International *Brain Awareness Week*, the ADHD group organized an open meeting March 14th attended by approximately 150 people from the general public. The talks were shown both in the Academy's main auditorium as well as in the neighbouring room. The program was: Terje Sagvolden: *ADHD – vår tids landeplage?* Espen Borgå Johansen: *Diagnosen ADHD*, Vivienne Russell: *ADHD and the brain*. Jonathan Williams: *Population "advantages" of ADHD*, Anneke Meyer: *ADHD in Africa*. <http://www.cas.uio.no/Groups/0405ADHD/Hjernensuke.html>

Contacts with the Norwegian political community: CAS received a lot of attention in the Norwegian political community this Academic Year, both in the Norwegian parliament and in the government, partly through the group leader's many meetings with parliamentarians, and partly through personal invitations of parliamentarians to various CAS events. In terms of research funds, these meetings so far have resulted in NOK 10 mill for basic research on ADHD. These contacts also resulted in the Norwegian Parliament in the National Budgets for 2004 and 2005 asking the Norwegian Government to consider establishment of a Norwegian Centre for Basic Research on ADHD at the University of Oslo. A decision is expected this autumn.

Throughout the Academic Year, the group leader gave numerous interviews in the Norwegian press, radio, newspapers and journals. Finally, members of the ADHD group participated in a large number of meetings in Norway as well as abroad.

6. Comments to the running of CAS

It is unfair to criticize an institution running as smoothly as CAS. The staff was very friendly and service minded. The offices and apartments functioned very well. Social interactions were nurtured by the friendly atmosphere creating a group of true friends of Norway. The rules imposed by the University of Oslo computer policy were at times in conflict with programs we needed for our work, but this aspect is outside of the CAS.

7. Conclusion

The ADHD group had a wonderful and very productive year at CAS. The group obtained more scientifically than anyone expected in advance. The proceedings are now materializing in new studies and insights into an enigmatic disorder. The new insights into ADHD will most likely form the basis of future diagnosis and treatment of ADHD. The impact of the ADHD group will be visible in international research for many years to come.

8. Preliminary publication list of the ADHD group

8.1 *Published articles*

Aase, H. & Sagvolden, T. (2005a). Infrequent, but not frequent, reinforcers produce more variable responding and deficient sustained attention in young children with attention-deficit/hyperactivity disorder (ADHD). *Journal of Child Psychology and Psychiatry*. Preprint on web.

Aase, H. & Sagvolden, T. (2005b). Moment-to-Moment Dynamics of ADHD Behaviour. *Behavioral and Brain Functions*, 1, 12.

Johansen, E. B., Sagvolden, T., Aase, H., & Russell, V. A. (2005). The dynamic developmental theory of attention-deficit/hyperactivity disorder (ADHD): Present status and future perspectives. *Behavioral and Brain Sciences*, 28, 451–454.

Killeen, P. R. (2005). Gradus ad parnassum: Ascending strength gradients or descending memory traces? Commentary on target article by Sagvolden T, Johansen EB, Aase H, & Russell VA. A dynamic developmental theory of Attention-Deficit/Hyperactivity Disorder (ADHD) predominantly hyperactive/impulsive and combined subtypes. *Behavioral and Brain Sciences*, 28, 432–434.

Russell, V. A., Sagvolden, T., & Johansen, E. B. (2005). Animal models of attention-deficit hyperactivity disorder. *Behavioral and Brain Functions*, 1, 9.

Sagvolden, T., Johansen, E. B., Aase, H., & Russell, V. A. (2005). A dynamic developmental theory of Attention-Deficit/Hyperactivity Disorder (ADHD) predominantly hyperactive/impulsive and combined subtypes. *Behavioral and Brain Sciences*, 28, 397–419.

Tannock, R. (2005). Hypodopaminergic function influences learning and memory as well as delay gradients: Commentary on target article by Sagvolden T, Johansen

EB, Aase H, & Russell VA. A dynamic developmental theory of Attention-Deficit/Hyperactivity Disorder (ADHD) predominantly hyperactive/impulsive and combined subtypes. *Behavioral and Brain Sciences*. 28, 444–445.

Toplak, M. E. & Tannock, R. (2005). Tapping and anticipation performance in attention deficit hyperactivity disorder. *Perceptual and Motor Skills*, 100, 659–675.

Wickens, J.R. and Tripp, E. G. (2005). Altered sensitivity to reward in children with ADHD: Dopamine timing is off. Commentary on target article by Sagvolden T, Johansen EB, Aase H, & Russell VA. A dynamic developmental theory of Attention-Deficit/Hyperactivity Disorder (ADHD) predominantly hyperactive/impulsive and combined subtypes. *Behavioral and Brain Sciences*. 28, 445–446.

8.2 *Articles in print*

Banaschewski T, Ruppert S, Tannock R, Albrecht B, Becker A, Uebel H, Sergeant JA, Rothenberger A. (in print). Colour perception in ADHD. *J Child Psychol Psychiatry. Journal of Child Psychology and Psychiatry*.

Laurin N, Misener VL, Crosbie J, Ickowicz A, Pathare T, Roberts W, Malone M, Tannock R, Schachar R, Kennedy JL, Barr CL (in print). Association of the calcyon gene (DRD11P) with attention deficit/hyperactivity disorder. *Biological Psychiatry*.

Tannock R (2005). Outcomes of language development: Commentary on target articles by Drs. N. Cohen and J. Beitchman for the Canadian Center for Excellence Encyclopedia: Centre of Excellence for Early Childhood Development.

Williams J, Sagvolden G, Taylor E, Dayan P & Sagvolden T (accepted) “Dynamic behavioural changes in the Spontaneously Hyperactive Rat: 1. Effects of variations in Inter-Reinforcer Time”, *Behavioural Brain Research*

Williams J, Taylor E (in print), “The evolution of hyperactivity, impulsivity, and cognitive diversity”, *Journal of the Royal Society Interface*.

8.3 *Submitted*

Auerbach, J.G. Gross, V., and Shalev, R. S. (submitted). Emotional and behavioral characteristics over a six-year period of youths with persistent and non-persistent dyscalculia.

Bedard A-C, Hogg-Johnson S, Tannock R (submitted). Meta-analysis of methylphenidate effects on inhibitory control and working memory in attention-deficit/hyperactivity disorder J Am Acad Child Adolesc Psychiatry.

Howe AE, Arnell KM, Klein RM, Joanisse MF, Tannock R. (submitted). The ABCs of computerized naming: Equivalency, reliability, and predictive validity of a computerized rapid automatized naming (RAN) task. Journal of Neuroscience Methods; special issue on methods in ADHD research.

McInnes A, Bedard A-C, Hogg-Johnson S, Tannock R (submitted). Preliminary evidence of beneficial effects of methylphenidate on listening comprehension in children with Attention-Deficit Hyperactivity Disorder. J AM Acad Child Adolesc Psychiatry.

Meyer, A. & Sagvolden, T. (submitted). Fine motor skills in South African children classified as ADHD: Influence of subtype, gender, age, and hand dominance. Behavioral and Brain Functions.

Toplak ME, Dockstader C, Tannock R (submitted). Temporal information processing in ADHD: Findings to date and new methods. J. Neurosci Methods; special issue on methods in ADHD research.

Wickens, J. R. Hyland, B. I., and Tripp, G. (submitted). Recent breakthroughs in basal ganglia research. Ed. E. Bezdard, Nova Science Publishers, Inc., NY.

Wigg KG, Takhar A, Ickowicz A, Tannock R, Kennedy JL, Pathare T, Roberts W, Malone M, Schachar R, Barr CL. (submitted). Serotonin transporter (HTT) and Attention deficit/hyperactivity disorder.

Williams, J., Meyer, A., Taylor, E. (submitted). "Preliminary evidence for a predicted DA+ endophenotype in a subset of ADHD children". Behavioral and Brain Functions.

Reference List

1. American Psychiatric Association: Diagnostic and statistical manual of mental disorders: DSM-IV, 4 edn. Washington, D.C.: Author; 1994.
2. Swanson JM, Sergeant JA, Taylor E, Sonuga-Barke EJS, Jensen PS, Cantwell DP: Attention-deficit hyperactivity disorder and hyperkinetic disorder. Lancet 1998, 351: 429–433.
3. Taylor E: Clinical foundations of hyperactivity research. Behav Brain Res 1998, 94: 11–24.

4. Taylor E, Sergeant J, Doepfner M, Gunning B, Overmeyer S, Mobius HJ et al.: Clinical guidelines for hyperkinetic disorder. European Society for Child and Adolescent Psychiatry. *Eur Child Adolesc Psychiatry* 1998, 7: 184–200.
5. American Academy of Pediatrics: Clinical practice guideline: diagnosis and evaluation of the child with attention-deficit/hyperactivity disorder. American Academy of Pediatrics. *Pediatrics* 2000, 105: 1158–1170.
6. Applegate B, Lahey BB, Hart EL, Biederman J, Hynd GW, Barkley RA et al.: Validity of the age-of-onset criterion for ADHD: a report from the DSM-IV field trials. *J Am Acad Child Adolesc Psychiatry* 1997, 36: 1211–1221.
7. Barkley RA, Biederman J: Toward a broader definition of the age-of-onset criterion for attention-deficit hyperactivity disorder. *J Am Acad Child Adolesc Psychiatry* 1997, 36: 1204–1210.
8. Cantwell DP: Classification of child and adolescent psychopathology. *J Child Psychol Psychiatry* 1996, 37: 3–12.
9. Weiss G, Hechtman L: *Hyperactive children grown up*, 2nd edn. New York: Guilford; 1993.
10. Sagvolden T, Johansen EB, Aase H, Russell VA: A dynamic developmental theory of Attention-Deficit/Hyperactivity Disorder (ADHD) predominantly hyperactive/impulsive and combined subtypes. *Behav Brain Sci* 2005, 28: 397–419.
11. Johansen EB, Sagvolden T, Aase H, Russell VA: The dynamic developmental theory of attention-deficit/hyperactivity disorder (ADHD): Present status and future perspectives. *Behav Brain Sci* 2005, 28: 451–454.
12. Aase H, Sagvolden T: Moment-to-Moment Dynamics of ADHD Behaviour. *Behav Brain Funct* 2005, 1: 12.
13. Schultz W, Dayan P, Montague PR: A neural substrate of prediction and reward. *Science* 1997, 275: 1593–1599.
14. Sonuga-Barke EJ: The dual pathway model of AD/HD: an elaboration of neuro-developmental characteristics. *Neurosci Biobehav Rev* 2003, 27: 593–604.

Appendix 1:

Survey of the joint seminars between the research groups 2005

05 January 2005	Professor Terje Sagvolden: "Validating an Animal Model of ADHD"
12 January 2005	Professor John Ole Askedal: "General Grammatical Differences between the Modern Germanic Languages with a View to Language History"
19 January 2005	Professor Vivienne Russell: "What do Animal Models tell us about ADHD"
26 January 2005	Dr. Jonathan Williams: "Problems of Models"
02 February 2005	Professor Kjartan Ottosson: "The Hidden Mechanisms of Language Change"
16 February 2005	Professor Anneke Meyer: "Cross-cultural Issues in ADHD"
23 February 2005	Dr. Steinar Børve: "Numerical Solutions to Problems in Physics"
02 March 2005	Dr. Dag Haug: "Model theoretic Semantics and Models of Semantic Change"
09 March 2005	Research Fellow Espen Borgå Johansen: "Exploring reinforcement processes using Intra-cranial self-stimulation"
16 March 2005	Professor Jan Trulsen: "Turbulence in Plasma: What is different from Turbulence in Fluids"
30 March 2005	Professor Einar Mjølhus: "Using the Ionosphere as a Laboratory for Plasma Turbulence"
13 April 2005	Dr. Heidi Aase: "ADHD From Basic Research to Treatment"
20 April 2005	Dr. Lars P. Dyrud: "Using plasma turbulence to understand the Global Impact of Billions of Daily Meteors"
27 April 2005	Professor Alice C. Harris: "Establishing and Maintaining Morpheme Order"

- 11 April 2005 Professor Lene Schøsler: "Historical Corpora Problems and Methods"
- 18 May 2005 Professor Robert Oades: Brain functions: 3 decades of development
- 25 May 2005 Professor Judith Auerbach: "Genes and Parenting: Risk Factors in the Development of ADHD"
- 21 September 2005 Professor Susan R. Suleiman: "Literary Innovation and Childhood Trauma"
- 28 September 2005 Professor Michael Rauscher: "Economic Geography and the Environment"
- 05 October 2005 Professor Richard Howarth: "Cost-benefit Analysis meets Participatory Democracy"
- 12 October 2005 Senior Research Fellow Karine Nyborg: "I don't want to hear about it: Rational ignorance among morally motivated consumers"
- 19 October 2005 Professor Hans van Houwelingen: "Predicting Patient Survival using Genomic Data"
- 02 November 2005 Professor Beatrice Sandberg: "To tell History/Histories: Subjectivity, Objectivity and Post-Modernism"
- 09 November 2005 Professor James Phelan: "Narrative Progressions and Narrative Judgement"
- 23 November 2005 Senior Research Fellow Rolf Golombek: "International Climate Agreements: How Economists Think"
- 30 November 2005 Senior Research Fellow Kjell Arne Brekke: "Self-serving Moral Reasoning"
- 07 December 2005 Associate Professor Anniken Greve: "Consider if this is a man"
- 13 December 2005 Dr. Carolyn Fischer: "Americans, cars and fuel economy"

Appendix 2:

The Scientific Director's external contributions, attendance at conferences and meetings in 2005

Publications:

Willy Østreng (ed.): *Convergence. Interdisciplinary Communications 2004/2005*, Centre for Advanced Study, Oslo, 2005, 178 pages.

Willy Østreng: "Complex-System Science and Discipline-Straddling Theories" in Willy Østreng (ed): *Convergence. Interdisciplinary Communications 2004/2005*, Centre for Advanced Study, Oslo, 2005, pp. 12–16

Willy Østreng: "The Changing Utility Pattern of the High North" in H. Kitagawa (ed): *The Northern Pacific in World Affairs*, Ocean Policy Research Institute, Tokyo, 2005, pp. 20–35

Willy Østreng: "Transport og miljøutfordringer i nordområdene" [Transport and challenges to the environment in the northern areas] in *Horisont*, no. 3, volume 6, 2005, pp. 80–97

Willy Østreng: *Fakta om nordområdene*, [Facts about the northern areas] *Ocean Futures*, Oslo, 2005, 120 pages, Mimeographed. Under review to be published. Co-authors: Johan Kvarving Vik, Steven G. Sawhill and Øystein B. Thommessen

Willy Østreng: "De arktiske land i en energipolitisk mellomfase" [The Arctic Countries in an energy political in-between phase] Mimeographed, Under review to be published. 12 pages

Lectures, meetings and attendance at conferences:

6 January: Seminar: *Utvidede Sikkerhetsutfordringer i nordområdene*, [Extended Security Challenges in the northern areas] The Ministry of Defence. Lecture: *Beslutningsprosesser i norsk nordområdepolitikk*. [Resolution processes in northern area policies]

30 July: *Jansrop-Conference 27–30 July*, Ocean Policy Research Institute, Tokyo: Keynote Address: *The Changing Utility Pattern of the High North*

13–17 October: *Tor Heyerdahl Seminar on inter-scientific research*, Colla Micheri, Italia

24 November: The Norwegian Petroleum Union's Annual Conference, Grand Hotel, Oslo. Lecture: De arktiske land i en energipolitisk mellomfase [The Arctic Countries in an energy political in-between phase]

30 November – 1 December: Norwegian – Russian seminar on logistics and the resource situation in the arctic part of Eurasia, Kirkenes

Centre for Advanced Study

at the Norwegian Academy of Science and Letters

Senter for grunnforskning

ved Det Norske Videnskaps-Akademi

Drammensveien 78

NO-0271 Oslo,

Norway

Telephone: +47 22 12 25 00

Telefax: +47 22 12 25 01

e-mail: cas@cas.uio.no

Internet: <http://www.cas.uio.no/>