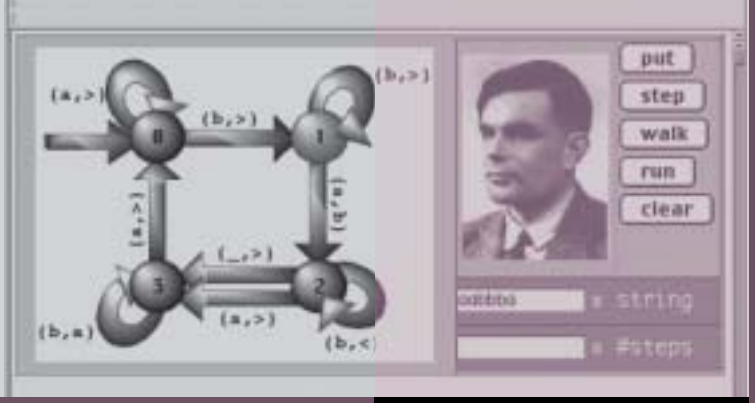
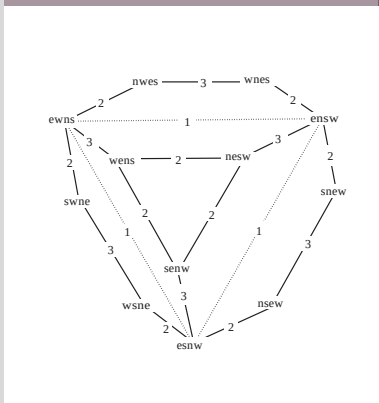
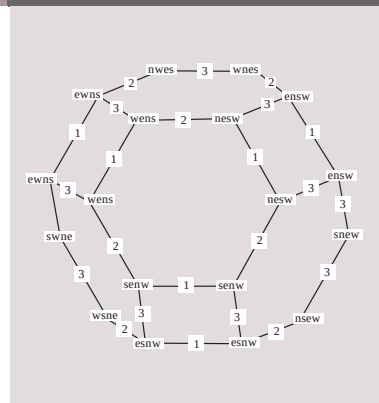


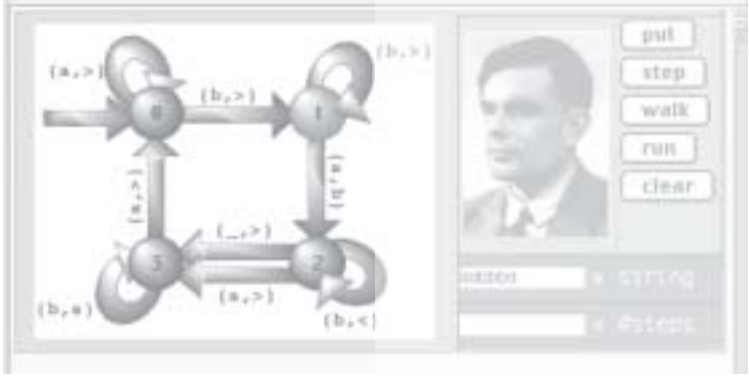
Institute for Logic, Language and Computation

Annual Report 2002

UNIVERSITEIT VAN AMSTERDAM







Institute for Logic, Language and Computation

Annual Report 2002

UNIVERSITEIT VAN AMSTERDAM

Amsterdam, July 2003

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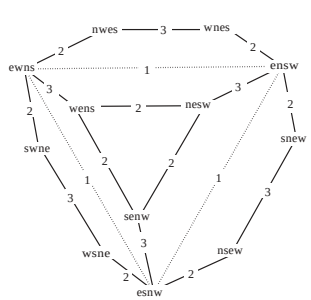
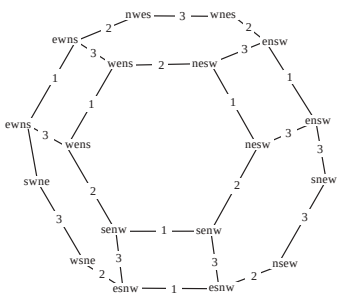
INSTITUTE FOR LOGIC, LANGUAGE AND COMPUTATION





Contents

Institute for Logic, Language and Computation

General information

Scientific mission

Many broad flows of information drive the modern technological world. It is a challenge for contemporary science to provide a deeper understanding of this phenomenon and where possible, enhance existing practices in dealing with it. Indeed information has become a crucial theme for scientific studies across many disciplines. Encoding, transmission and comprehension of information are the central topics of research at the Institute for Logic, Language and Computation (ILLC) of the Universiteit van Amsterdam. The broader context in which ILLC sees itself is that of an information science that is concerned with information flow in natural and formal languages, as well as many other means of communication, including music and images of various kinds. Research at ILLC aims at developing logical systems that can handle this rich variety of information, making use of insights across such disciplines as linguistics, computer science, cognitive science, artificial intelligence and philosophy. Additional methods are actively pursued as well, whenever relevant, ranging from statistics to argumentation theory. In addition to its specific research goals, ILLC aims at overcoming traditional borderlines between faculties and disciplines and serves as a rallying point for information scientists across computer science, linguistics, philosophy, and the social sciences. The resulting view of information science transcends the boundaries of the university. ILLC is also committed to dissemination of its results into the broader world of general education, vocational training and industrial research.

Research projects

ILLC's research program is divided into projects oriented toward a particular subject matter. This division also reflects the way research is actually carried out. Projects cut across the various groups that make up ILLC. The 2002 project reports can be found at pages 13-25.

1. Theory of Interpretation
2. Cognitive Systems and Information Processing
3. Constructive and Intensional Logic
4. Language and Inference Technology
5. Algorithmics and Complexity Theory

Participants in ILLC in 2002

Participating Departments

Faculty of Science: Department of Computer Science
Faculty of Humanities: Department of Philosophy
Faculty of Humanities: Department of Linguistics
Faculty of Social Sciences: Department of Sociology

Scientific Advisory Board

Solomon Feferman (Stanford), Wilfrid Hodges (London), Hans Kamp (Stuttgart), Gordon Plotkin (Edinburgh), Jörg Siekmann (Saarbrücken)

Scientific director

Martin Stokhof

Deputy scientific director

Dick de Jongh

Managing director

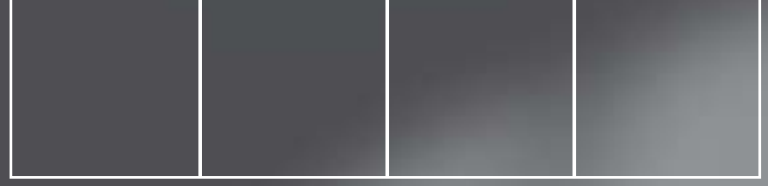
Ingrid van Loon

Management support

Ria Rettob, Tanja Kassenaar, Marjan Veldhuisen, Marco Vervoort,

Graduate Program in Logic

Dick de Jongh (director), Peter Paul de Witte (program manager)



Scientific staff, students, guests

Department of Computer Science

Senior Staff

Pieter Adriaans, Krzysztof Apt, Johan van Benthem, Rens Bod, Harry Buhrman, Kees Doets, Jan van Eijck, Peter van Emde Boas, Theo Janssen, Dick de Jongh, Maarten de Rijke, Leen Torenvliet, Yde Venema, Paul Vitányi

Postdocs

Carlos Areces, Massimo Franceschet, Lex Hendriks, Karin Müller, Detlef Prescher, Stefan Schlobach, Menno van Zaanen, Domenico Zambella

KNAW-fellow

Khalil Sima'an

PhD students

Nick Bezhanishvili, Sebastian Brand, Boudewijn de Bruin, Caterina Caracciolo, Sjoerd Druiven, Rosella Gennari, Juan Heguiabehere, Willem Jan van Hoeve, Aline Honingh, Clemens Kupke, Gabriel Infante Lopez, Valentin Jijkoun, Troy Lee, Christof Monz, Gabriele Musillo, Yoav Seginer, Merlijn Sevenster, Börkur Sigurbjörnsson, Neta Spiro, Maarten Stol, Mehmet Tepedelenlioglu

Associated researcher

Joop Niekus

Scientific Programmers

Willem van Hage, Vera Hollink, Nanning Poelsma

Emeritus

Anne Troelstra

Department of Philosophy

Senior Staff

Renate Bartsch, Reinhard Blutner, Paul Dekker, Jeroen Groenendijk, Herman Hendriks, Henkjan Honing, Karen Kwast, Michiel van Lambalgen, Martin Stokhof, Frank Veltman

Postdocs

Maria Aloni, Alastair Butler, Jaap Maat

KNAW-fellow

Robert van Rooy

PhD Students

Elsbeth Brouwer, Balder ten Cate, Marian Counihan, Hartmut Fitz, Darrin Hindsill, Rosja Mastop, Marie Nilsenova

Department of Linguistics

Senior Staff

Remko Scha, Henk Zeevat

Department of Sociology

Senior Staff

Michael Masuch, Breanndán Ó Nualláin

Postdocs

Maarten Marx, Jaap Kamps

Emeritus

Rob Mokken

PhD Student

Ivar Vermeulen

Graduate Program in Logic

Students 2000-2001 (completed the program in 2002)

MSc students

John Duda (USA), Mehmet Giritli (Turkey/Cyprus), Fabrice Nauze (France), Börkur Sigurbjörnsson (Iceland), Fadillah Tala (Indonesia), Mathieu Vidal (France).

Students 2001-2002

MSc students

Steffen Bauer (Germany), Luciano Buratto (Brazil), Seth Cable (USA), Willem Conradie (South Africa), Marian Counihan (South Africa), Irwin Lim (Singapore), Bernadette Martinez Hernandez (Mexico), William Rose (USA), Joshua Sack (USA), Katrin Schulz (Germany), Raj Singh (Canada), David Wood (Canada)

Other students

Roger Antonsen (Norway), Massimiliano Cappuccio (Italy), Dabiel Gebler (Germany), Gabriele Pulcini (Italy), Egon Stemle (Germany), Mingzhong Tao (China), Wei Wei (Germany)

Students 2002-2003

MSc students

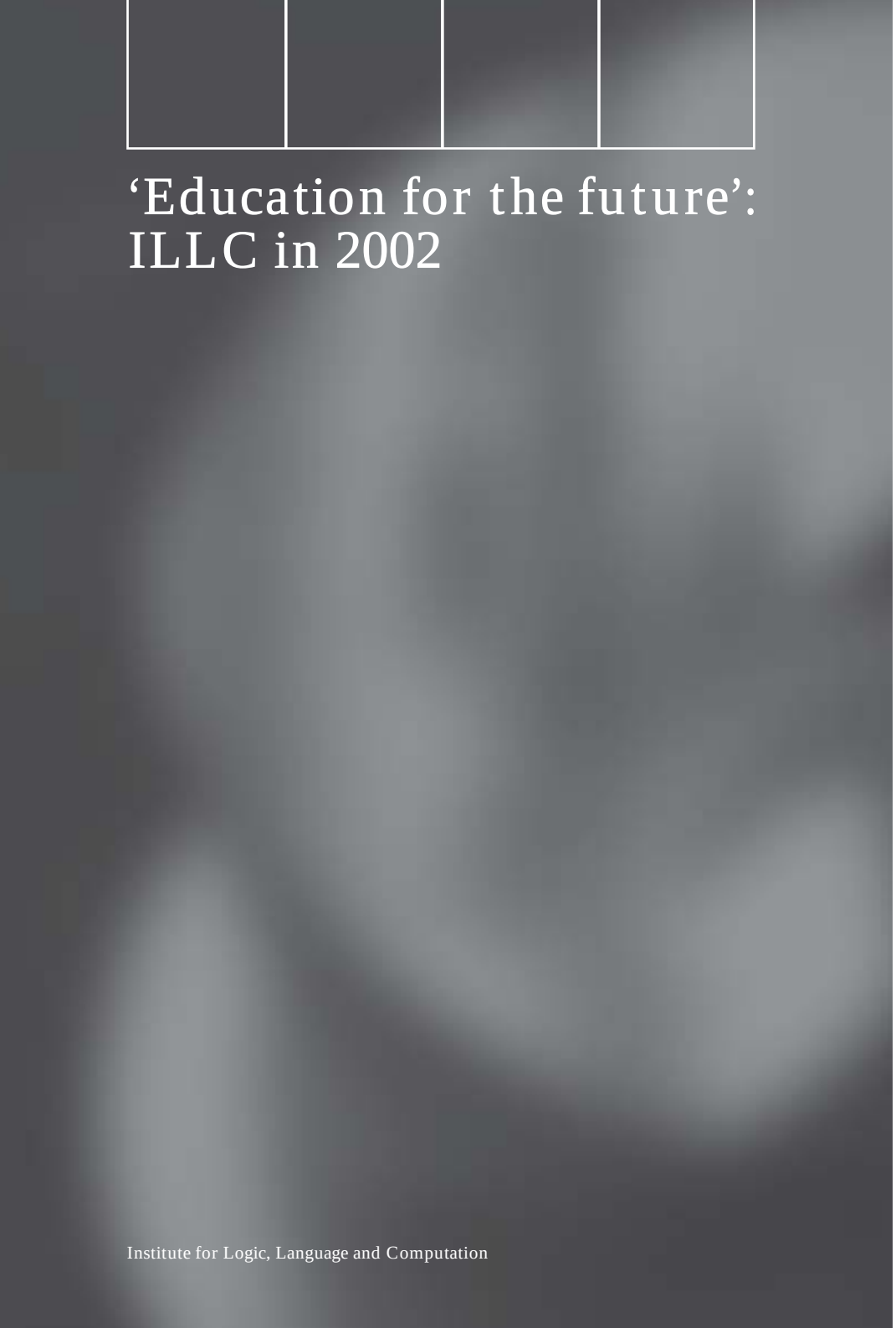
Loredana Afanasiev (Moldavia), Guillaume Aucher, (France), Giosué Baggio (Italy), Be Birchall (Canada), Jill Cirasella (USA), Spencer Gerhardt (USA), Julia Grodel (USA), Tanja Hötte (Germany), Gilad Mishne (Israel), Clive Nettey (United Kingdom), Thuy Linh Nguyen (Vietnam), Konstantino Sarras (Greece), Oren Tsur (Israel), Chunlai Zhou (China).

Exchange students

Dirk Walther (Germany), Andreas Zollmann (Germany)

Guests/Guest PhD students

Raffaella Bernardi (Italy), Wim Berkelmans (Netherlands), Enrico Franconi (Italy), Tom Frühwirth (Germany), Lucian Galescu (USA), Roy Bar Haim (Israel), Joe Halpern (USA), Ian Hodkinson (Great Britain), Rosalie Iemhoff (Austria), Joost Joosten (Netherlands), Paola Merlo (Switserland), Karin Müller (Germany), Anna Pilatova (Czech Republic), Arjen Poutsma (Netherlands), Detlef Prescher (Germany), Jerry Seligman (Taiwan), Maarten van Schie (Netherlands), Andreas Weiermann (Germany), Tine Wilde (Netherlands)



‘Education for the future’: ILLC in 2002

One of the defining features of the classical university is the intimate relationship between research and teaching. The dual nature of the university’s mission, to conduct research and to train students, although perhaps not equally obvious in all disciplines, is quite rightly cherished as an important asset. Every field of research needs a constant flow of new talent in order to rejuvenate and develop. Society needs experts that are able to understand and make use of the results of research. And even the most seasoned researcher sometimes needs the curiosity of the novice and the freshness of his perspective that teaching can offer.

Although the Universiteit van Amsterdam’s ‘matrix model’, consisting as it does of separate research institutes, teaching institutes and departments, may lead one to think otherwise, in all the different implementations of that model research and teaching remain intrinsically related. In view of that it is no surprise that the introduction of the bachelor-master system in Dutch higher education has been one of the important events within ILLC in 2002.

Research

But let us start with research. In this respect 2002 was again a good year for ILLC. The numbers of refereed publications, invited talks and other types of scientific output continue to be at high levels. Over the years there is some fluctuation in the numbers of dissertations completed, but no more than can be expected given the absolute number of PhD students. In 2002 ILLC researchers were engaged in the organization of a remarkably high number of international scientific events, another fact that testifies to the international reputation that many of them have.

The year 2002 was also a successful one in terms of second stream funding. A number of new postdoc and PhD positions were acquired on various NWO funded projects. Other additional funds came from the Central Research Budget of the Universiteit van Amsterdam: the Theory of Interpretation and Logic and Cognitive Systems groups got two additional PhD positions financed, as an acknowledgement for being rated ‘excellent’ in two successive VSNU Research Quality Assessments (in 1995 and in 2000).

Third stream funding remains at a modest level. The LoLaLi project, financed by Elsevier Science is entering its final phase. Plans to continue this research are

already underway. Furthermore, the Language and Inference Technology group and Pieter Adriaans will participate in the VL-E project 'Food Informatics', which is expected to receive funding from the BSIK Program of the Ministry of Economic Affairs.

The two foci identified in ILLC's long term research programme, viz., relations with cognitive science and computation-oriented research, are by now firmly established as distinctive elements of ILLC's research profile. In the latter field the high level of second stream funding in 2002 was maintained, mainly by the very active members of the Language and Inference Technology group. In cognitive science hopes are high for the second round in NWO's Cognition programme, to be held in the fall of 2003: in the preparatory grants competition that precedes the second call for proposals several ILLC members were successful.

Not all is well, however. The tendency of major funding agencies, such as NWO and the EU, to work with very large scale programs, in combination with a strong orientation on research that has practical applicability in the foreseeable future (a trend that is quite evident for example in the EU's 6KP programme), works against research that is theoretically oriented and small-scale, often individual. Parts of ILLC's research are like that, for example, the work in mathematical logic, or that on philosophical foundations. And logic is no exception in this. Other fields, such as mathematics and theoretical physics, are in a similar position, as are many of the humanities.

Understandably, the Faculty of Science anticipates this development in funding policies and strives to organize its resources in larger administrative units that have enough 'critical mass' to be able to face the challenge. Although this certainly seems a sensible thing to do in the experimental sciences, where research is often large scale and very expensive, there is a real danger for the smaller, more theoretically oriented disciplines. Here collocating resources may turn out to be merely an administrative move that results in a loss of identity for which not much is gained.

Teaching

As was said in the introduction, at ILLC education and teaching were prominent activities in the year 2002. The major reason for this was the nation-wide transition of Dutch higher education to a bachelor-master system. The new structure meant the overhaul of the various curricula ILLC contributes to. These are quite a few, a fact that reflects the interdisciplinary nature of ILLC: computer science, artificial intelligence, linguistics, philosophy are the main programmes ILLC is involved in. In some cases the changes were relatively easy to make, in others they have resulted in completely new curricula.

Also important was the development of a new master programme in logic. The current Master in Logic programme (MoL), which started in 1995, was geared exclusively toward students from abroad. Over the years the MoL programme has proved to be a success: a modest but steadily growing number of students from all over the world are attracted by the wide range of courses in logic and its applications that ILLC has to offer. It is also successful in this sense that the large majority of MoL- students complete the programme in time and subsequently enter a PhD programme. The bachelor-master restructuring operation provided the opportunity to define a two-year masters programme in logic. It is open to students who hold a bachelors degree in computer science, artificial intelligence, linguistics, or philosophy. Therefore it has to accommodate students with heterogeneous backgrounds, of course without compromising the standards set by an MSc degree in logic. That calls for a subtle balance between flexibility and general requirements. Moreover, the original one-year MoL-programme had to be redefined and fitted into the new structure as well. The end result is a curriculum of which ILLC has great expectations. An exciting question was how the extension from a one-year to a two-year programme would influence the attractiveness for foreign students. In the spring of 2003 the answer was clear: positively! A record number of 23 foreign students are expected to start the new master programme in logic in September.

Another teaching activity that ILLC members were actively engaged in during 2002 was the definition of a master programme in cognitive science. Since 2002 ILLC participates in the Centre for Cognitive Science (CSCA) of the Universiteit van Amsterdam, a collaborative effort of biologists, psychologists, linguists, and logicians and philosophers. One of the first targets set by the CSCA was the development of an integrated master programme in cognitive science, accessible for students with appropriate backgrounds in a variety of disciplines. In the academic year 2002-2003 the master programme was offered on an experimental basis. Although hardly advertised, it already attracted 13 students. In its first official year, 2003-2004, some 30 students are expected to start with the programme.

Administration

One remark that has been made a number of times in ILLC's annual reports concerns its awkward position in the university's administrative structure. Being part of three faculties, with three different types of financial organization, human resources management, employment regulations, and so on, creates a complicated and time-consuming environment in which ILLC's administrators have to operate. That this situation needs to be remedied, as it hampers effective employment of resources, has been acknowledged by all parties. But very little has been done about it. On pain of being repetitious (but after all, didn't Cato get what he wanted with Carthage in the end?): this is a problem that needs to be solved. And it can be, if only the people responsible are willing to allow a few deviations of general rules and procedures here and there.

Regarding the administration there were also a number of positive developments. The Faculty of Science implemented various measures concerning human resource management, among others the regular 'Sociaal-medisch Overleg', which will allow better monitoring and more effective interaction with employees with health problems. In the Faculty of Humanities the financial responsibility for PhD positions was transferred to the research institutes. Along with a number of other measures this was regulated in a covenant between the faculty and the institutes.

ILLC's internal administrative landscape also saw some changes in 2002. In January Peter Blok, ILLC's administrative manager since 1998, left to take up another position in the Faculty of Science. In April 2002 Ingrid van Loon, until then programme manager of the Master of Logic programme, became the new administrative 'face' of ILLC.

Also in 2002 ILLC's 'penvoerderschap' of the Dutch Graduate School in Logic (OZSL) effectively came to an end with the resignation of its scientific director Jan van Eijck, who had been in charge since 1997. The Department of Philosophy of Utrecht University has agreed to take over the penvoerderschap, with Albert Visser as the new scientific director. The official transition is expected to be completed by the summer of 2003.

Conclusion

There continues to be a steady flow of students from all of the world to ILLC and its program in logic, and although the absolute numbers may not be spectacular, they are definitely remarkable for a relatively small field. Many ILLC members are collaborating with researchers in other fields on topics of common interest. It shows that the distinct profile of ILLC, viz., logic in a broad sense, with ample attention for the diverse and mutual relationships with neighbouring disciplines, is an attractive one. It is also quite a unique profile, for the Universiteit van Amsterdam, but also for the discipline as such. Like the intrinsic relationship between research and teaching, this is something to be cherished and to care for. And it is our task, as researchers, teachers and as administrators, to do just that.

Martin Stokhof

Fundamental research: Project reports

1. Theory of Interpretation

Project Leaders

Jeroen Groenendijk, Martin Stokhof

Characterization

The project investigates the logical and philosophical foundations of a formal theory of interpretation. Its main goal is the development of tools for adequate interpretation of natural language, testing these against both empirical data as well as methodological and philosophical constraints.

Main Themes

The three main themes in the project are: interpretation in conversation; cognitive aspects; philosophical backgrounds.

Research on interpretation in conversation focuses on interpretation as a dynamic process in actual conversation. It builds on earlier research on the dynamics of interpretation at sentence level, applying the results of that research to phenomena which play a key role in the structuring of discourse, in particular of conversations. To this end the scope of existing formalisms needs to be extended to cover multi-speaker exchanges. Relevant empirical phenomena that are studied here include question-answering, the structure of information in conversational exchange, and the use of mood and intonation. Increasingly the research in this theme makes use of decision theory and game theory in the analysis of the procedures which are used by rational communicative agents in both production and interpretation. This research had strong links with ongoing work on game theory and dynamic logic in the project Constructive and Intensional Logic. Computational feasibility of the resulting theories is a topic of investigation in the project Language and Inference Technology.

Work in the second theme, cognitive aspects, uses the framework of ‘dynamic conceptual semantics’ (DCS), a formal model of the way in which concepts arise from (relatively) unstructured data. This model is closely connected with the data-oriented approach towards information processing used in the projects

Logic and Cognitive Systems and Language and Inference Technology. Within the context of DCS the role of consciousness vis-à-vis the possibility of language in general and semantics in particular has been investigated, using both connectionist, neural network based models of learning as well as more traditional approaches in terms of rules and representations. Currently research is directed towards the role of memory (general and specific historical memory) in the understanding of situations and linguistic utterances. Another central topic within the cognitive aspects theme is the study of metaphor, which raises important questions concerning the origins and the transfer of meaning, its dependence on context and background, and its relation to general cognitive processes of analogy and imagery.

Research on philosophical backgrounds involves coming to grips with the presuppositions and limitations of the kind of theories developed in the first two themes. Historical and philosophical analyses of various key notions used there also bring out connections with different paradigms. Topics addressed within this theme include the historical origins and subsequent development and employment of the notion of an ideal language; the historical backgrounds of modern intensional semantics, in particular that of the central principle of compositionality; the relevance of contemporary approaches in philosophy of language for theoretical frameworks in linguistic semantics.

Researchers

Maria Aloni, Renate Bartsch, Alastair Butler, Paul Dekker, Jeroen Groenendijk, Theo Janssen, Jaap Maat, Robert van Rooy, Martin Stokhof.

PhD Students

Elsbeth Brouwer, Balder ten Cate, Marie Nilsenova, Tine Wilde

External Cooperation

In the Netherlands there is cooperation with researchers in Utrecht and Tilburg. Further cooperation involves researchers in Berlin, Frankfurt, Helsinki, Nancy, Osnabrück, Oxford, Stanford, and Stuttgart.

2002

Research within the first theme, interpretation in conversation, saw several interesting developments. In the NWO and KNAW projects 'Formal Language Games' and 'Games, Relevance and Meaning' questions, topicality, presupposition and contextual restriction have been studied. Focus has been on the particular ways in which such linguistic means guide linguistic agents in structuring information in context, and the way in which that fits in with their rational activities and decision making. Although the subjects themselves are relatively well-established, the approach taken is new, in that it adopts a general perspective on both formal (syntactic, prosodic) and pragmatic (conversational) aspects, while paying due attention to the cognitive and social nature of rational agents. Methodologically, the connections between dynamic semantics, game theory, and decision theory have been furthered; empirically the scope of the work has been extended with a number of constructions, such as polar questions, question declaratives, free choice disjunctions, intentional reference, apparent scope island violations, and negative polarity items.

In the second theme, cognitive aspects, the general structure of memory (general memory and specific memory, including episodic memory) as a capacity of conceptualisation of new experiences and of reconstruction of previously experienced episodes has been modelled in the form of an architecture of neuronal fields. The formation of general and individual concept has been illustrated by examples from Proust's novel 'A la Recherche du Temps Perdu'. Work on metaphor has been concerned with an indepth study of implications of current theories of concept formation for the role of imagination and imagery in the construction and understanding of metaphor. Focus has been on Bartsch's theory of dynamical conceptual semantics and the perceptual symbol systems of Barsalou.

In the third theme, philosophical backgrounds, a book containing annotated translations of Leibniz's writings on rational grammar is in preparation. Furthermore, a collaborative project with the University of Oxford is being developed. The project centers on the construction of a website, which is designed as a resource for both teaching and research in intellectual history. Research on Hintikka's logic for information independence was continued. It was shown that this logic is not a conservative extension of predicate logic (contrary to what Hintikka expected), and that it also lacks some other standard properties. A long-term project concerning the interrelations between language,

logic, ontology and ethics in Wittgenstein's early thought was concluded with a book publication. Work on the relationship between contemporary approaches in philosophy of language and theoretical frameworks in linguistic semantics was continued. A first result, focusing on the consequences of linguistic normativity for the conceptual relation between meaning and interpretation was published.

2003

Within the first theme, interpretation in conversation, research on the logical formalization of game-theoretic concepts remains high on the agenda. The integration of dynamic semantics and theories of question-answering and topic/focus will be pursued, and more in particular the structure of information and strategic inquiry will be investigated from both an internal (qualitative) and external (quantitative) perspective. Philosophical foundations of these theories will be tested by investigating how and to what extent the evolution and use of natural language relies on a balance between cognitive (rationality) and social (conventional) aspects. Besides these pragmatic aspects of the theory of interpretation, syntactic and prosodic issues remain high on the agenda, e.g., structural constraints on binding and movement (of Wh-phrases, for instance), differential subject and object marking, intonational features of questions and declaratives, etc.

Work in the second theme, cognitive aspects, will continue with an investigation of the special role of the episodic memory in experiencing new situations and in understanding and taking up linguistic utterances. Here too Proust's text will be used to provide exemplifications. The investigation of the conceptual status of metaphor will be completed. Defence of the dissertation is foreseen for the fall.

In the third theme, philosophical backgrounds, the work on Leibniz and rational grammar will continue. The book will be ready for publication in 2003. Also work on the web site will continue, in co-operation with researchers in Oxford and researchers from the Language and Inference Technology project. Investigations into the properties of logics for informational independence, not only of Hintikka's original logic but also of the variant proposed by Caicedo and Krynicky, will continue. Work on contemporary philosophy of language will focus on the philosophical presuppositioning of the role that the compositonality principle plays in linguistic semantics.

2. Cognitive Systems and Information Processing

Project leaders

Michiel van Lambalgen, Remko Scha

Characterization

This project consists of two subprojects.
The Cognitive Systems project (CS) emphasizes both the logical study of cognitive processes and the psychological study of logical reasoning. Our guiding principle is that logic may benefit from interaction with empirical science, and vice versa. Cognitive processes studied include the mental representation of space, time and modality and their natural langue correlates. Our psychological investigations concentrate upon reasoning with various kinds of conditionals, both in healthy subjects and in subjects with neurological and psychiatric disorders.
The project Information Processing (IP) is concerned with the design of algorithms which interpret and/or generate messages expressed in various natural languages. It construes the notion of 'language' broadly, to also include graphics and music. The methods employed in this project build on formal theories of linguistic syntax and logical semantics, but extend these with statistical and complexity-theoretic techniques which are inspired by theories of human Gestalt perception. The project aims to develop computational methods which are cognitively plausible as well as practically useful.

Main themes

Reasoning with uncertainty (CS)
In this subproject we have investigated theory and practice of reasoning with incomplete information, with an emphasis on practice in the later years. This subproject has now been concluded, although we still offer courses on the subject.

Psychology of reasoning (CS)
Here we investigate empirically reasoning in healthy and in cognitively impaired subjects, we evaluate the results with respect to their relevance for cognitive architecture, and we devise mathematical models to explain the observed results.

Semantics of tense and aspect (CS)
The guiding theme is the application of formalisms for reasoning about time and change, as developed in AI, in this area. The cognitive motivation is that language may to some extent be built on the mental apparatus for planning, but we also consider applications to natural language processing.

Mood and modality (CS)
This subproject studies the grammatical phenomenon of mood in relation to other phenomena such as tense, and applies dynamic semantics to account for the data.

Cognitive Modelling (CS)
Computational models of discourse and context constitute another long-standing theme within this project. The research on this topic is carried out in close cooperation with the work on discourse dynamics in the project 'Theory of Interpretation'. It complements this work in that it focusses more on linguistic issues and empirical coverage. The models developed here articulate the structural properties of discourse by means of unification grammars, and employ type theory and dynamic logic to represent semantic interpretations and their context-dependence.

Optimality theory (CS)
The main ideas of this work are based on the tenets of the so-called 'radical pragmatics' school. Seeing linguistic meanings as underdetermining the content (proposition) expressed, there must be a pragmatic mechanism of completion which can be best represented as an optimization procedure. The hypothesis is that the explanatory principles wished-for can best be approached by means of the general framework of bi-directional Optimality Theory.

Symbolic and subsymbolic information processing (CS)
A major open problem in cognitive science concerns the gap between symbolic and subsymbolic (neuron-like) modes of computation/processing. Complex symbolic systems like those of grammar and logic are essential when we try to understand the general features and the peculiarities of natural language, reasoning and other cognitive domains. On the other hand, most of us believe that cognition resides in the brain and that neuronal activity forms its basis. Yet neuronal computation appears to be numerical, not symbolic, and parallel, not serial. The aim of present research is to overcome this gap by viewing symbolism as a high-level description of the properties of (a class of) neural networks.

Data-Oriented parsing (IP)
A central theme in this project is the development of a performance model of natural-language processing, called Data-Oriented Parsing (DOP). This model de-emphasizes the problem of delimiting the class of 'grammatical' sentences. Instead, it assumes an overgenerating competence grammar, and focusses on the problem of statistical disambiguation. A data-oriented parsing system emplyos a large corpus of annotated utterances as a representation of its 'past language experience', and makes its parsing decisions on the basis of statistics about arbitrarily large subtrees from this corpus.

Musical and visual processing (IP)
Work in this area proceeds along three parallel tracks. One of these focuses on simplicity-based accounts of visual Gestalt perception, and takes its inspiration from the work on Structural Information Theory (SIT) at the University of Nijmegen. It develops algebraic image-description languages in order to broaden the empirical scope of the SIT approach.
Secondly, there is a collaboration with the 'Music Mind Machine' group at the University of Nijmegen (NICI), concerned with modeling temporal aspects of music, in particular rhythm perception and categorization.
Our third and most innovative line of research on Gestalt perception was launched in September 2001, with the start of a NWO-funded 'innovation-impulse' project called 'Towards a Unifying Model for Linguistic, Musical and Visual Processing'. This project takes the Data-Oriented Parsing model of linguistic processing as its paradigm, and attempts to generalize it to musical and visual processing. We expect that a memory-based approach of this kind will provide a viable alternative (or at least a necessary complement) to the usual simplicity-based accounts of Gestalt-perception. The project will continue until 2006, and is particularly focused on Gestalt perception in music.

Computational modeling of music cognition (IP)
This project is concerned with the study of the temporal aspects of music, in particular rhythm perception and categorization. The research is conducted in cooperation with of the 'Music, Mind, Machine' group, part of the University of Nijmegen (NICI / Perception).

Researchers

Michiel van Lambalgen, Frank Veltman, Remko Scha, Henk Zeevat, Reinhard Blutner, Rens Bod, Karen Kwast, Henkjan Honing, Khalil Sima'an, Menno van Zaanen

PhD Students

Hartmut Fitz, Darrin Hindsill, Rosja Mastop, Katrin Schulz, Aline Honingh, Arjen Poutsma, Neta Spiro.

External cooperation

ACLC and CSCA, Amsterdam. Philosophy of language, NICI and Max Planck Instituut in Nijmegen. CSLI and Linguistics in Stanford. Human Communication Research Center, Edinburgh. Sprachwissenschaft, Tübingen. Linguistics, Antwerp. Linguistics, NorthWestern University. Humboldt University and ZAS in Berlin. Sprachwissenschaft at Potsdam University (Germany). Computer Science, Utrecht University. Computer Science, Tokyo University of Agriculture and Technology.

Results in 2002

Reasoning with uncertainty.

The expertsystem for diagnosing alcoholism, developed in collaboration with two psychiatrists from St. Luke's Hospital (Amsterdam) has been tested in clinical practice the past year. The results have been written up and submitted to a medical journal. This project has now been concluded, but the collaboration will continue in the subproject 'psychology of reasoning'.

Psychology of reasoning.

January 2002 saw the beginning of the NWO program 'Logic meets psychology: nonmonotonicity' awarded to van Lambalgen and Veltman. In the first part of the project we investigate actual reasoning processes and try to come up with mathematical models, based on our current knowledge of working memory. Stenning (Edinburgh) and van Lambalgen submitted an article on this and finished the first version of a book.
A beginning was made with the investigation of reasoning processes in high-functioning autists. An interest group met in London in November; part of the research is now performed in a psychiatric hospital in the Netherlands, with the help of several Dutch psychiatrists.

Semantics of tense and aspect

In the second part of the NWO project, we investigate the application of planning formalisms to the semantics of tense and aspect, based on the idea that human structuring of time, and hence temporality in natural language, is mostly concerned with goals and plans. A book on this topic will appear with Blackwell in 2004; a good part of this has been written in 2002. Some parts will soon be published separately as articles, e.g. the chapters on aspectual coercion and on French past tenses.

Mood and modality

This is the third part of the aforementioned NWO project. This year has been devoted to setting up the infrastructure for an international network 'Mood and modality'. This network has initiated workshops at ESSLLI2003 and the 2003 Amsterdam Colloquium, and a special issue of the Journal of Semantics.

Optimality theory (CS)

Continuing earlier research, the framework of bidirectional Optimality theory has been applied to the domain of pragmatics (conversational implicature).
A collection of essays 'Optimality Theory and Pragmatics' has been edited. Furthermore, one handbook article has been written: 'Pragmatics and the lexicon' - to appear in Horn & Ward (Eds.) 'Handbook of Pragmatics' (Blackwell).

Cognitive Modelling (CS)

Joint work with Potsdam and ZAS on the functional interpretation of differential case marking has become quite influential and has led to simulation work largely confirming the model developed there, and to new work refining the typological insights from their earlier work on differential case marking. There is large scope for application to other phenomena. Other work in 2002 has included an attempt to apply bidirectionality to statistical parsing and generation, and an almost finished paper on presupposition accommodation.

Symbolic and subsymbolic information processing (CS)

Combining methods of algebraic semantics and nonmonotonic logic, the possibility of integrating both modes of viewing cognition is demonstrated. The main results are (a) that certain activities of connectionist networks can be interpreted as nonmonotonic inferences, and (b) that there is a strict correspondence between the coding of knowledge in Hopfield networks and the knowledge representation in weight-annotated Poole systems.

Data-Oriented Parsing (IP)

One of the many open issues in Data-Oriented Parsing is the choice of the 'probability model'. It is not obvious what the optimal procedure is for deriving the substitution probabilities of tree-fragments from the pattern of occurrences of these fragments in an annotated corpus. In 2002 we made some important discoveries about this problem. Experiments were carried out testing the most important existing models: the classical 'naïve' model (which simply employs relative frequencies) and a more complex alternative model (which weighs for tree-size in a theoretically well-motivated fashion). Both models performed significantly less well than a newly developed probability model which in a sense 'interpolates' between them.

A research effort on using 'Alignment-Based Learning' to bootstrap syntactic structures in 'flat' text corpora was rounded off. The approach was experimentally compared with other techniques (EMILE), and various integrations with Data-oriented Parsing were investigated.

Musical and visual processing (IP)

We continued our work on algebraic simplicity-based accounts of visual perception, in collaboration with the Computer Science departments of Utrecht University and Tokyo University of Agriculture and Technology. Some journal articles were completed.

The research on temporal aspects of music focused on the study of rhythm perception and categorization, and the influence of temporal context (such as meter). Categorization is defined as the mapping of the continuous space of performed temporal patterns to the discrete, symbolic space of rhythmic categories. One question is whether this mapping is influenced by the metrical context in which the temporal patterns are presented. Several existing models of meter induction were tested on the systematically collected empirical data. Much to our surprise, they were not successful in explaining the empirical results. Their low explanatory value was consequently interpreted as evidence for a possible dissociation between the cognitive processes of categorization and meter induction.
A main concern was the investigation of the usefulness of various natural language processing and machine learning techniques for musical processing. A new integrative model inspired by Data-Oriented Parsing was developed that analyzes both linguistic and musical input. This model combines the principle of simplicity, mainly used in music and Gestalt perception, with the principle of likelihood, which is dominant in natural language processing.
Finally, an experiment was carried out on the use of DOP and the modeling of meter induction on the basis of corpora of musical scores.

Plans for 2003

Work in the NWO project 'Logic meets psychology' will partly be concerned with the construction of evolutionary and cognitively plausible models of the development of human logical and linguistic processing, the idea being that changes in the architecture of working memory made such processing possible. This research will involve collaboration with colleagues from the Cognitive Science Center Amsterdam (CSCA). A book applying these ideas to the semantics of tense and aspect must be finished in 2003.
Work in the NWO project 'Towards a unifying model for linguistic, musical and visual processing' will be concerned with the extension of our integrative model of linguistic and musical perception to visual perception. We will continue our research into scientific reasoning by means of DOP. We will also intensify our work on metrical parsing. Several subprojects will pay attention to formal and empirical aspects of language change; a new PhD student will join CSIP to investigate mood from both a typological and a diachronic point of view.

3. Constructive and Intensional Logic

Project Leaders

Johan van Benthem, Dick de Jongh

Characterization

This project continues the long-standing Amsterdam tradition in mathematical logic and the foundations of mathematics. The original core theme of constructivism has been narrowed down towards the role of intuitionistic logic and provability in theories of various kinds.
The broad study of modal and dynamic logic splits into two themes, first, the mathematical theory of modal logic and second, the developement of logics for systems with many agents. Thus the two main 'trademarks' of mathematical logic at Amsterdam fit together in their efforts to create a general framework for reasoning and information flow.

Main Themes

In the first theme, concerned with logics of informal and formal proof, the semantic foundations of constructive theories are investigated in terms of Kripke models and categorical models. A specific tool is formed by the so-called n-universal models closely related to finitely generated free algebras. The study of provability and interpretability in classical theories and of provability and preservativity in constuctive theories is closely related. Topics include interpolation properties, axiomatic completeness and modal-style analysis of further proof-theoretic notions.

The second theme in this project is the mathematical theory of modal logic. Our general goal is to embed modal logic in its wider mathematical environment. Crucially, modal languages are often designed to strike a balance between reasonable expressive power and manageable computational complexity. An in-depth study of this trade-off naturally links modal logic with areas like (finite) model theory or automata theory. Algebraic logic, the study of systematic connections between logic and classes of algebras, is another key topic: our investigations center around questions of correspondence, duality and canonicity. And finally, a promising recent perspective on modal logic that we are considering is coalgebra, in particular, in its universal algebraic form.

The third theme in the project is logics which can analyse action and communication in systems with many agents. We study a wide range of modal systems for information update and interaction, aiming for a framework combining broad coverage with elegant mathematical foundations. This involves new connections between logic, process theories in computer science and economic game theory. Signals in such processes can be symbolic, but also visual. We also study modal languages of spatial structures.

Secondary themes are logical learning theory and the study of the recent history of Dutch logic. In logical learning theory the intention is to study new concepts of efficient learning and to develop efficient algorithms for the learning of linguistically relevant classes of grammars like categorial grammars and context-free grammars.

Researchers.

Johan van Benthem, Kees Doets, Jan van Eijck, Lex Hendriks, Dick de Jongh, Joop Niekus, Anne Troelstra, Yde Venema, Domenico Zambella.

PhD students

Nick Bezhanishvili, Boudewijn de Bruin, Clemens Kupke, Yoav Seginer.

External cooperation

The group maintains close connections with logic groups at the universities of Aachen (informatics), Arizona, Bloomington, Edinburgh, Groningen, Liverpool, London (Imperial college, King's College), Moscow (Stekhlov Institute for Mathematics), München, Münster, New York (CUNY), Oxford, Prague, Rochester, Siena (Logic Graduate School), Stanford (CSLI, Computer Science), Udine, Utrecht, and the Hungarian Academy of Sciences in Budapest (mathematics).

2002

Bezhanishvili and de Jongh studied the n-universal model of intuitionistic propositional calculus, in particular the case of n=2. Many facts concerning exactness, independence, projectivity and Ruitenburg's theorem and Pitt's theorem are clarified in this context. Bezhanishvili showed that the only

independent substitutions of n-formulas in the n-generated free Heyting algebra are the permutations, thereby improving a result of de Jongh and Chagrova. Hendriks and de Jongh finished their article on the characterization of strong equivalence of logic programs in intermediate logics.
Goris, in working on a master's thesis, constructed modal sytems with both an interpetability operator and a Sigma-1 predicate. He obtained modal and arithmetic completeness proofs and showed a rather surprising failure of interpolation in these systems thereby demolishing the hope that introduction of the Sigma-1 predicate would lead to interpolation properties.

Together with Gehrke and Nagahashi, Venema finished a paper on canonicity and correspondence results for modal logics that generalize ordinary ones by allowing weaker forms of complementation than standard Boolean negation. The most important result is a general Sahlqvist-style theorem describing a large set of sequents for which a general completeness and correspondence result holds. Venema also provided an example of a variety of modal algebras with only atomless members.
Translated into logic this yields a very strong incompleteness result for modal logics. Another result by Venema is a characterization of algebraic subdirect irreducibility for modal algebras in terms of their dual topological, relational structures.
Finally we mention a result obtained in cooperation with ILLC-visitor Hodkinson (London): using Erdös-style probabilistic arguments, Hodkinson and Venema proved the existence of logics that cannot be axiomatized by canonical formulas.

In february, Clemens Kupke started his work as a PhD student on the CoMoLo project, a cooperation with Computer Science in Nijmegen and the CWI at Amsterdam which focuses on connections between modal logic and coalgebras. As a first result, together with Kurz (now a lecturer at Leicester) Kupke and Venema introduced the notion of a Stone coalgebra. They also showed that descriptive general frames, which figure prominently in modal logic, can naturally be described as coalgebras for the Vietoris functor on Stone spaces.

Within the third theme, Van Benthem determined the complete set of structural rules governing dynamic inference with public update. He also obtained a generalization of epistemic product update with Bayesian update in a probabilistic setting. Finally, he completed a survey paper on basic update logic summarizing his results of the past four years on connections with themes in mathematical logic such as preservation theorems and the logic of relativization operators.

Van Benthem wrote a number of papers at the interface of logic and game theory, including the completeness of evaluation games for general game algebra, a survey with a unifying perspective on logic games and their game-theoretic content, connections with branching temporal logic, and a new analysis of game-theoretic rationality in terms of repeated update and logics with inflationary fixed-points. He taught courses on the whole 'Logic in Games' project in Amsterdam, Stanford, and Siena. Finally, NWO PhD student Boudewijn de Bruin investigated the solution concept of backward induction, resulting in a mu-PDL analysis of subgame perfection and sequential rationality. He also gave conference presentations on connections with the philosophy of science and the semantics of natural language, viz. plural pronouns and collective action.
In september, a new collaboration started with the Inigma project on the proper modelling and computational complexity of imperfect information games (reported on in the Algorithmics and Complexity Theory project), which resulted in a lively larger group of staff and students, which organized its first international Workshop on November 26th.
See the homepage *http://www.illc.uva.nl/lgc* for a survey of activities in this area at ILLC.

As for topics more loosely related to the third theme, Aiello defended his dissertation on modal logics of space and tasks in processing of visual information. Van Benthem wrote papers on modal logics of space and their connections with geometry with Aiello (now a lecturer at Trento), and Bezhanishvili and Gehrke (New Mexico). These papers have been accepted for various journals.
He also wrote invited papers on logical models for categorial grammars, the representation of theories in the philosophy of science, and the logical system of Bernard Bolzano. De Bruin wrote a critical evaluation of Popper's notion of rationality in the social sciences.

In learning theory Seginer obtained a characterization of the 2-letter rigid categorial grammars, thereby solving a problem of Kanazawa, and developed very efficient algorithms learning these grammars. The results were presented at ICGI in Amsterdam.

Niekus showed how Brouwer's post-war introduction of the so-called creative subject stems directly from his largely unnoticed work on individual choice sequences of the late twenties. The results were presented at PILM 2003 in Nancy.

Some Project Highlights

The project was prominently involved in the First North-American Summer School of Logic, Language and Computation (NASSLLI 1) at Stanford, June 24-30. Van Benthem was program director, while modal logic and logic & games were course and workshop themes.
For information: http://www.stanford.edu/projects/nasslli

A highlight in fall was the 7th Dutch Workshop on Logic, Games and Computation (http://www.illc.uva.nl/lgc/) which attracted some 40 participants from all over Europe. Contacts were made for further cooperation.

2003

Bezhanishvili and de Jongh intend to finish reproving many classical results on intuitionistic logic in a uniform manner by means of the n-universal models, and to obtain new characterizations of embeddings of fintely generated free Heyting algebras. Addition of a relative Sigma-1 predicate is the next hope for interpolation in interpretability logic. Hendriks expects to obtain a characterization of the new anticipation-like connectives.

Venema will continue his investigations of the algebraic theory of modal logic. In 2003 he plans to focus on duality and canonicity issues for expanded lattice structures. The contacts with New Mexico (Gehrke) will be extended to include cooperation with Harding in the field of MacNeille completions. Other research activities will be directed towards algebraic and coalgebraic aspects of modal fixpoint theory. In the field of coalgebraic modal logic, Kupke will exploit our insights on Stone coalgebras, and try to generalize these beyond the Vietoris polynomial case. The existing cooperation of Kupke and Venema with Kurz (Leicester) and Rutten (CWI) will be continued.

Van Benthem will finish his monograph on 'Logic in Games', documenting the larger program behind the work of the last few years. Work will continue on linking up with complexity theory, through the Inigma project. The same goes for links with the social software program of Parikh and Pauly. New input is expected from descriptive set theory, with the appointment of Dr. Benedikt Loewe as assistant professor. Finally, cooperation will be sought with other groups involved in the national program for cognitive science, looking at more realistic human performance in communication and interaction. Eventually, this may lead to a new mathematical direction, where dynamic logic meets the theory of dynamical systems.

Seginer is developing new efficient algorithms for learning categorial grammars and context-free grammars with structure. It turns out that it may be very helpful to reformulate classical categorial grammars for this purpose. Cooperation with Adriaans has been started and further cooperation is envisaged with language acquisition experts like Jacqueline van Kampen from OTS in Utrecht.

Niekus will continue his work on individual choice sequences in Brouwer by studying hitherto neglected ocurrences of this notion in Brouwer's work and by trying for a formalization in certain Kripke models.

Loewe will join our faculty in April. His research will concentrate on transferring results from finite game theory to set-theoretic (infinite) games, not only techniques for imperfect information games as in the VMOSII project, but also techniques from other areas like games with more players, coalition games etc. that have been never investigated in the case of infinite games. It is expected that this research is connected to proof theory (weak systems of second order number theory). In addition to this, Loewe will be continuing his research on Infinitary Combinatorics under the Axiom of Determinacy and Gupta-Belnap Revision Theory.

4. Language and Inference Technology

Project Leaders

Michael Masuch, Maarten de Rijke

Characterization

Research within the Language and Inference Technology (LIT) group is aimed at developing and studying the computational, linguistic, statistical and logical underpinnings of (effective ways of providing) intelligent information access. Addressing the latter task requires synergy between AI-research, IR-techniques, and natural language processing. Our leading methodology is to identify real-world scenarios that give rise to interesting research challenges. If possible we try to address such challenges from a broad spectrum of perspectives, ranging from foundational and theoretical to experimental.

The group's research and teaching initiatives are accompanied by service activities with the aim of furthering the use of computational linguistic and computational logic tools in ongoing research at ILLC, in language, logic, and information. These activities range from maintaining workbenches and test sets to developing front ends for computational systems.

Main Themes

The overall aim of the projects carried out within the Language and Inference Technology group is to put abstract theories to work with the aim of gaining insights in the algorithmic and representational aspects of language, information and communication.

Research activities within the Language and Inference Technology group fall under one or more of the following headings:

'Computing with Information'. Work under this heading covers topics such as spatial reasoning and image retrieval, semistructured data, cross-lingual retrieval, mono-lingual retrieval for European languages, question answering systems, knowledge representation, and the semantic web.

'Computing with Language'. This heading covers topics such as lexical semantics, parsing technologies, computational syntax and semantics, information extraction, and disambiguation.

Finally, work under the 'Computing with Logic' heading includes constraint satisfaction problems, expressive power and functionality of restricted description languages (including modal, description, and feature logic), proof and decision methods for modal-like logics, satisfiability testing for propositional and modal solvers; verification; automated reasoning.

Software: much of the research in the Language and Inference Technology group is aimed at understanding the computational behavior of language processing and inference techniques, especially in relation to their potential benefits for real world information processing tasks. As a consequence, there is a strong emphasis on implementation efforts. In 2002 we continued our development on the following software products:

- ETNA (Economische Toepassingen van Neurale Analyse), which is aimed at predicting economic features using neural networks.
- FlexIR, a document retrieval system for Dutch, English, Finnish, French, German, Italian, Spanish, and Swedish. Various extensions have been created to address additional tasks such as domain-specific retrieval, web-retrieval, XML-retrieval, and novelty.
- HyLoRes, an automated theorem prover for hybrid logics based on direct resolution.
- The LoLaLi.net environment is a pilot aimed at exploring multiple ways of accessing online scientific resources.
- MoTEr, a testing environment for modal and modal-like logics that provides a convenient setting for the experimental analysis of modal provers, using a variety of test sets.
- Tequesta, a corpus-based question answering system.
- Webstraction, a tool for analyzing Internet discussion sites on a daily basis, attempting to measure general views, attitudes and opinions.
- 'WordNet Visualization Scripts', a set of scripts for visualizing the structure of the WordNet lexical database.

In addition, development work has started on the following:

- The QVal system, aimed at using model checking methods for analyzing questionnaires.
- Support tools for debugging medical terminologies.

Researchers

Krzysztof Apt, Carlos Areces, Massimo Franceschet, Jaap Kamps, Maarten Marx, Michael Masuch, Rob Mokken, Karin Müller, Detlef Prescher, Maarten de Rijke, Stefan Schlobach, Khalil Sima'an.

PhD students

Sebastian Brand, Caterina Caracciolo, Rosella Gennari, Juan Heguiabehere, Willem Jan van Hoeve, Gabriel Infante-López, Valentin Jijkoun, Gabriele Musillo, Christof Monz, Börkur Sigurbjörnsson, Maarten Stol, Petrucio Jorge Viana, Ivar Vermeulen.

Support Staff

Willem van Hage, Gertjan van der Hoeven, Vera Hollink, Gilad Mishne, Breanndán 'O Nualláin, Nanning Poelsma.

Grants

Research in the Language and Inference Technology group is largely funded by external sources. Continuing the stream of successful grant submissions in 2001, several project proposals were approved during 2002.

External cooperation

Academic external collaborations involved Alechina (Nottingham), Becher (Buenos Aires), Bernardi (Bolzano), Blackburn (Nancy), Demri (Paris), Fisher (Liverpool), Fundulaki (Bell Labs), Gabbay (London), Gardent (Nancy), Lutz (Dresden), Hiemstra (Enschede), Montanari (Udine), Moortgat (Utrecht), Muthukrishnan (Rutgers), de Nivelle (Saarbrücken), Ohlbach (München), Sattler (Dresden), Schlingloff (Berlin), Striegnitz (Saarbrücken), de Vries (CWI), UC Berkeley (Haas School of Business), Technion Haifa, Stanford University, IMS Stuttgart, University of Manchester, Liverpool University, and Imperial and King's College, London. Industrial collaborations involved Bolesian, Elsevier Science, IBM, IRION, Xerox Europe, Unilever.

Members of the group were involved with a large number of national and international initiatives, organizations and events, including the Association for Computational Linguistics (ACL); Association for Computing Machinery (ACM); Advances in Modal Logic (AiML); the Association of Logic Programming (ALP); Belgian-Netherlands Artificial Intelligence Conference (BNAIC); Computer Aided Deduction (CADE); Cross-Language Evaluation Forum (CLEF); CologNET; Dutch Information Retrieval Workshop (DIR); the European Association for Computational Linguistics (EACL); the European Conference in Artificial Intelligence (ECAI); ERCIM; Hybrid Logic (HyLo); the European Association for Logic, Language and Information (FoLLI); Inference in Computational Semantics (ICoS); Initiative for the Evaluation of XML retrieval (INEX); Methods for Modalities (M4M); and WOLLIC.

2002

Within the 'Computing with Information' theme network analysis of data on the Internet search engine market was used to validate a formalization of the organizational theory of resource partitioning.
Multidimensional scaling techniques were used to analyse the structure of lexical databases; this resulted in robust measures for extracting emotive or affective meaning, which have been put to use for Internet opinion polling. There was extensive work on retrieval methods for (non-English) European languages and on domain-specific collections, which was evaluated as part of the CLEF evaluation campaign. Work on corpus-based question answering, web-based retrieval, and locating new information was evaluated as part of TREC. The research into retrieving XML-documents was evaluated within the INEX initiative.
Finally, there was continued development work on the infrastructure of and content for a prototype implementation of a glossary based browser for the 'Handbook of Logic and Language'.

The 'Computing with Language' theme featured work on statistical models of natural language processing, as well as their application for question answering technologies. There were investigations into dependency parsing and into robust extraction of semantic representation from phrase-structure tree-banks. Also,

there were investigations into machine learning of stochastic feature structure grammars from phrase-structure tree-banks. There is an ongoing project on developing a Hebrew Tree-Bank within a project on corpus-based analysis of Hebrew. A spectrum of methods was studied for computing light-weight entailments between open domain natural language texts.
And there was further research on logical and algorithmic aspects of structural reasoning in categorial grammars.

In the 'Computing with Logic' line, there has been research on new modal languages, such as hybrid logics and description logics, and their applications to semantic web languages as well as languages for reasoning about semistructured data, telecommunications, medical terminologies, and mobile systems. In the area of logic and constraints there was work on a denotational semantics for first-order logic that captures the two-level view of the computation process typical for constraint programming, and on efficient schedulers for rules in the context of rule-based constraint programming. In December, Gennari defended her PhD thesis on constraint satisfaction problems and modal reasoning. Furthermore, work continued on resolution-based modal theorem proving methods and implementations, on a modal testing environment, and in collaboration with colleagues at the Academisch Medisch Centrum (AMC) we started working on support tools for developing terminologies, such as debugging, explanation, and summarization.

2003

The principal research activities of the LIT-group in 2003 will continue to be driven by real-world problems that we will address in a multifaceted way. This will include developing, adapting and extending state-of-the-art technology from NLP, Computational Logic and Information Retrieval, experimental evaluation and user-studies, as well as investigating the theoretical properties of the problems and the solutions at hand.

5. Algorithms and Complexity Theory

Project Leaders

Peter van Emde Boas, Leen Torenvliet

Characterization

Informatics is a unifying paradigm between alpha, beta and gamma disciplines. From this perspective the potential domains and application areas of research in complexity are numerous and range from fundamental issues in quantum computing to questions in biology, cognitive psychology and planning and scheduling. The main themes of the project are algorithmic methods, complexity analysis and programming methodology. Specific subjects are quantum information processing, computational learning (focusing on grammar induction, cognition and AI), network algorithms, computational complexity theory, descriptive complexity and its applications and computational game models.

Main Themes

Quantum coherent computation is a new field of research that has attracted an increasing number of computer scientists and physicists over the last 10 years. In the last years evidence has arisen that the proposed coherent quantum computers may be (and for some tasks are) intrinsically much faster than classical computing devices. Aside from this potential for technological development these models are also of theoretical interest as they may lead to the solution of open problems in complexity theory, but also to increased understanding of quantum phenomena in nature.

A central theme in machine learning is the so-called 'Minimum Description Length Principle', which states that any regularity in any given set of data can be used to compress these data. The more regularity, the more compression. A specific example investigated involves learning context free grammars from positive examples.

A main theme in the study of algorithms is Kolmogorov complexity. Research in complexity theory focuses on reductions and completeness notions. In distributed computations and network models problems like mutual search and naming conventions in networks are investigated.

The recent field of computational game models aims at bridging the conceptual gap between the anthropomorphic conceptions invoked in agent theory in AI and object technology on the one side and traditional computational models on the other. Modeling imperfect information of agents turns out to be the major bottleneck.

Researchers

Pieter Adriaans, Harry Buhrman, Peter van Emde Boas, Leen Torenvliet, Paul Vitanyi

PhD Students

Mart de Graaf, Wim van Dam, Troy Lee, Merlijn Sevenster, Sjoerd Druiven

External Cooperation

The cooperation with CWI is at the core of this project. Furthermore the coordination of the 5th European framework project Quantum Algorithms and Information processing is centered at CWI (Buhrman). This framework involves eight European partners, three Canadian and one American. Vitanyi is site manager in the EU Network of Excellence QUIPROCONE which includes 35 sites. Finally, there are many long-term research relations with numerous institutes.

2002

Wim van Dam completed his PhD thesis on the subject of quantum information theory and quantum computing (algorithms) and quantum computation. Buhrman, together with R. de Wolf (whom recently returned to CWI after a postdoc period in Berkeley), proved the surprising fact that efficient zero-error quantum algorithms cannot always be composed in stark contrast to the situation in classical computing. Mart de Graaf obtained a relativized separation between quantum computing and mod(p**k) counting classes.

Vitanyi, in cooperation with N. Vereshchagin, obtained results in a reconstruction of Kolomogorov's proposal from 1974 to found statistical theory on finite combinatorial principles, independent of probabilistic assumptions, invoking Kolmogorov's structure function. Together with Ming Lee, Xin Chen, Xin Li and Bing, Ma, Vitanyi introduced a new class of metrics for the effective similarity relation between sequences.

The NWO supported project (InIGMA), supervised by Peter van Emde Boas and Johan van Benthem, on semantics and complexity of Imperfect Information games started in September 2002 with the appointment of two AIO's Merlijn Sevenster and Sjoerd Druiven.

The monograph on semi-computability authored by Lane Hemaspaandra and Leen Torenvliet was finalized and published in 2002.

2003

Early developments in the InIGMA project indicate a close connection between the problem of designing a useful configuration space for imperfect information games and the update problem as studied within the project Theory of Interpretation.

The UMEEPI project on measuring and modeling data traffic on the Internet, started by Leen Torenvliet and Wim Vree (TUD), which is a cooperation between UvA, TUD, KPN-TNO research and RIPE-NCC, is now starting to produce its first results. Two PhD students in Delft are working on the project under the guidance of Leen Torenvliet and Wim Vree.

In 2003 the groups of de Rijke and Adriaans will start to work on the Adaptive Information Disclosure (AID) subprogram of the Virtual Lab (VL-E) project. The AID program aims at building a suite of dynamic model driven information and knowledge extraction tools on top of a grid architecture. This suite of tools will be tested in the context of the Food Informatics subproject of VL-E. Keywords are: semantic models, agent technology, formal concept analysis, datamining, textmining, gridmining, grammar induction, question answering and the dynamic maintenance of ontologies.

The main efforts in 2003 of the group based at CWI will be in the direction of quantum algorithmics and - communication research, in compression-based learning and applications, for example minimum description length and algorithmic statistics and the similarity metric applications, and in computational genomics.

Feeling the mood

Rens Bod

DOP: How far can we go?

It is a happy coincidence that the 'P' in 'DOP' can be instantiated in many interesting ways. Standing originally for Data-Oriented Parsing, DOP has also become known as Data-Oriented Processing, and in my NWO Vernieuwingsimpuls-project the acronym stands for Data-Oriented Perception. The underlying idea of DOP is that newly perceived input is understood in terms of previously perceived input. Or more specifically, DOP analyzes new data by probabilistically combining fragments from a corpus of previously analyzed data. But why should we want to model perception by DOP in the first place? Why can't we do this by a much more succinct system of rules, a grammar?

The answer can best be given if we look at language: during the last decade or so it has become increasingly clear that many linguistic phenomena display properties of continua and show markedly gradient behavior. It has also been shown that speakers' well-formedness judgments of words and sentences are extremely well predicted by the combined probabilities of their subparts. This has led to a sea change in modeling language, with a majority of the field turning to the use of probabilistic models learned from richly annotated corpora. The DOP approach can be seen as an umbrella which covers most of these models and which share the idea that knowledge of language should be understood not as minimal set of rules but as a statistical ensemble of previous language experiences that changes slightly every time a new utterance is perceived or produced.

Although this idea has led to some very successful models for linguistic as well as for musical and visual processing, it has some cognitive consequences that not everybody would take for granted. One such consequence is that humans massively store previous experiences, a view which for a long time has been regarded as highly controversial. During the last decade, however, a large body of psychological research has shown that people in fact build a huge fragment memory. In music, people store an enormous number of musical patterns, and in vision, people have a remarkably large visual memory, especially with respect to face recognition. In psycholinguistics, it has been shown that people not only store lexical items, bigrams and collocations, but also frequent phrases and whole sentences, and that such units can directly be used for processing new input (see the overview work by Dan Jurafsky).

So yes, I think there is good reason to believe in Data-Oriented Perception. And I also think there is good reason to extend DOP to other fields of cognitive psychology. For many cognitive activities, such as manual reaches and arithmetic operations, it has been shown that people store results in memory so that they can be retrieved whenever needed rather than being computed from scratch ('Data-Oriented Psychology'). And if you believe in Jerry Fodor's dictum that 'cognitive science is where philosophy goes when it dies', then DOP could just as well mean 'Data-Oriented Philosophy'. As it happens, the DOP approach has indeed quite a bit in common with research at ILLC's Philosophy department. In particular Renate Bartsch's work on dynamical conceptual semantics is, like DOP, based on large numbers of stored perceptual experiences and statistically relevant relations between these experiences.

But what about the more formal disciplines within the ILLC, such as logic?
Well, a data-oriented approach could certainly be helpful for logical applications such as Proof theory and Problem solving — again 'P's!
Rather than proving every new theorem from scratch, a logician may productively re-use derivation steps from previous proofs. A number of automated theorem provers actually work that way by storing previously proved theorems in a database. Given a sufficiently large database of proof trees, one may even circumvent any explicit rule or principle, as they will be implicit in the subtrees that are going to be combined by DOP. This idea has been used in some paradigms for problem solving such as explanation-based learning (EBL) and case-based reasoning (CBR).

Yet there is one discipline where rumor has it that rules work so well that a DOP approach seems useless. That discipline is Physics. What would a 'Data-Oriented Physics' look like? Rather than just laws, we would have a corpus of derivations (proof trees) that describe each step in linking laws to phenomena. New phenomena can be explained or predicted by combining subderivations of previous phenomena. But does this make sense if we can do the same job with laws only? However, can we do the same job with laws only? In other words, can physics be fully described by an axiomatic system of laws and bridge principles (the syntactic view of theories) or by a class of set-theoretical models (the semantic view of theories)? The answer is no: there are no general principles that link laws or models to phenomena. Each physical phenomenon has its own way of being linked to laws via approximation schemes, corrections, boundary conditions and normalizations.

Just take the well-known exponential-decay phenomenon in radioactive processes. As any physics textbook can tell you, this phenomenon cannot be derived from the

equations of quantum mechanics by some set of general principles. It can only be approximately derived, for example by a markov approximation over a perturbation expansion of Pauli's equation. But even before you can do this approximation, you first need to create what Nancy Cartwright called a 'theory-friendly' description of the phenomenon that will bring it into the theory. You will have to know what boundary conditions can be used, what normalization procedures are valid, and the like. Thus the laws of quantum mechanics alone don't predict anything. And the same even counts for the laws of classical mechanics: in order to fit Newton's equations of motion to an actual phenomenon such as Galileo's pendulum, you need to know which assumptions and approximations should be made at which steps in the derivation (e.g. make the angle of swing 'a' small enough so that cos(a) can be approximated by one).

Thus for each phenomenon you have to figure out how it can be linked to the relevant laws. Fortunately this does not mean that a resulting link is useless for understanding new phenomena. As every student of physics knows, once you have learned how to fit Newton's equations to a number of phenomena you can use certain derivation steps for a range of other phenomena (for example, parts of the derivation of the pendulum carry over to oscillators). Thomas Kuhn was on the right track when he emphasized the importance of 'exemplars' in the training of scientists. And I agree with Ronald Giere that scientists possess a large collection of exemplars which makes it possible for them to recognize a new situation as 'similar' to previous situations. It is exactly here that I think Data-Oriented Physics should come in. Kuhn's exemplars are DOP's derivations from laws to phenomena, and Giere's notion of similarity is DOP's matching algorithm that tries to build new derivations out of previous derivations. The fewer subderivations you need to derive a new phenomenon, the more similar this phenomenon is to previous phenomena. (This has a probabilistic correlate in that fewer subderivations tend to result in a higher probability for the whole derivation.)

So yes, I also believe in Data-Oriented Physics. Physics is not just about discovering laws or models for phenomena, it is about discovering derivations from laws to phenomena, usually via approximations, corrections, boundary conditions and the like. Finding these derivations can be hard, but once you have found some of them, you can productively re-use parts of them for explaining and predicting new phenomena. Rather than a minimalist system of laws, I strongly believe science should be viewed as a 'maximalist' system of known phenomena in the light of which future phenomena are understood. It was perhaps this what W.V.O. Quine envisaged in 1953 when he wrote: 'As an empiricist I continue to think of the conceptual scheme of science as a tool, ultimately, for predicting future experience in the light of past experience.'

Next time I'll make a case for Data-Oriented Politics!

Education and communication

Graduate Program in Logic in 2002

The Graduate Program in Logic is an international study program organized by ILLC. In 2002 it included a PhD program, a MSc program, a Certificate program and the possibility for exchange or contract students to spend a semester/year at ILLC. It offered courses and research in foundations of mathematical and philosophical logic and their applications in computer science, linguistics and cognitive science.

The MSc program was a full year program, consisting of course work and a Master of Science thesis. Earning a MSc degree took students a minimum of twelve months, but mostly more time was required to complete a Master's. On the whole of 2002 there were 33 MSc students. 19 students had started the program in 2001 or earlier. 14 students started September 2002. 10 students received their degree and one received a certificate. Besides, 7 exchanges students were enrolled for a period varying from one trimester to one year.

PhD Program

As in most PhD programs, the work in the ILLC PhD program is divided into two parts. Firstly, the student acquires a fairly broad but rigorous working knowledge in the field of logic and its applications. The ILLC organizes this part of the PhD program in cooperation with the Dutch Graduate School in Logic (OZSL, see below). This school offers a national program of courses, colloquia, workshops and annual PhD conferences (all in English). Secondly, the student carries out original research and writes a dissertation under the guidance of two dissertation supervisors. During the first year of the program, the emphasis is on training and from the second year onwards, the emphasis is on research.
In 2002 ILLC had 35 PhD students. The following dissertations were succesfully defended:

Nikos Massios: *Decision-Theoretic Robotic Surveillance*
Marco Aiello: *Spatial Reasoning: Theory and Practice*
Yuri Engelhardt: *The Language of Graphics*
Willem Klaas van Dam: *On Quantum Computation Theory*
Rosella Gennari: *Mapping Inferences: Constraint Propagation and Diamond Satisfaction*

Graduate Program in Logic in 2003

As of September 2003 the educational system in the Netherlands will be fully compliant with the regular bachelor-master model used elsewhere in the world. As a result the structure of the Graduate Program in Logic is going to change starting at the beginning of the academic year 2003/2004.

Master of Science program

The MSc program will become a two year curriculum. The full program will be 120 ECTS, and will consist of course work (90 ECTS) and a MSc thesis (30 ECTS).

Advanced track

For advanced students, who have obtained relevant qualifications in their earlier studies, it will be possible to get exemptions for specific courses. Minimum requirements are the MSc-thesis (30 ECTS) and 30 ECTS of course-work. Exemptions are determined by the Board of Examiners.

The 'Logic Year'

As of September 2003 the ILLC will offer a one year program called the 'Logic Year'. The 'Logic Year' Program will be 60 ECTS, and will consist of course work (48 ECTS) and a short thesis (12 ECTS). It will offer the same areas of specialization as the MSc program. After completion the student is awarded a certificate. Students in the 'Logic Year' Program can, if they wish, switch to the MSc program after one year.

PhD program

The PhD program remains unchanged.

Information about the Graduate Program in Logic can be found at *www.illc.uva.nl/gpil*

PhD training and the OZSL

The PhD training of the ILLC takes place in collaboration with the Dutch Graduate School in Logic (OZSL). Until November 2002, the director of the school was Jan van Eijck (Amsterdam/Utrecht), and ILLC's managing director was the secretary. From November 2002 onwards, Albert Visser (Philosophy Department, University of Utrecht) is the director.

ILLC researchers are very active in the educational program of OZSL, and until November 2002, ILLC also housed the bureau of the school.

Partners in the Dutch Graduate School in Logic:

- the Institute for Logic, Language and Computation (ILLC), Universiteit van Amsterdam,
- the Research Institute for Language and Speech, section Computational Linguistics and Logic, of the Faculty of Arts of Utrecht University
- the Institute for Mathematics and Computer science (IWI), incorporating the Faculty of Mathematics and Natural Sciences of the University of Groningen
- the Institute for Behavioral and Cognitive Neurosciences (BCN) incorporating the Faculty of Mathematics and Natural Sciences, Medicine, Arts and Psychology and Philosophy of the University of Groningen,
- the Centre of Language and Cognition Groningen incorporating the Faculty of Arts of the University of Groningen (participation through BCN)
- the Center for Mathematics and Computer Science (CWI), Amsterdam
- the Faculty of Computer Science of the Free University of Amsterdam
- the Faculty of Philosophy and Faculty of Arts of Tilburg University
- individual associates of the University of Leiden and the University of Nijmegen

The Educational Program

The OZSL organizes one or two schoolweeks yearly, and a varying number of masterclasses throughout the year. Also, the OZSL is heavily involved in the European Summer Schools of Logic, Language and Information (ESSLLI). In 2002, ESSLLI took place in Trento.

The OZSL Autumn Schoolweek of 2002 took place on October 14–18 in Amsterdam. This event offered a broad range of tutorials and discussion opportunities, up-to-date overviews of the staff and PhD research carried out within the school (Staff Accolade and Accolade New Style), an occasion for social interaction between PhD students, and between students and staff members. In detail, the following events took place:

- Student Accolade: a one-day opening event where PhD students gave short short presentations of their research.
- Courses on Non-Wellfounded Multisets, on Logic and the Theory of Social Choice, on Cognitive Modelling, and on Polarity and Negation in Natural Language
- Adult Accolade: one-day closing event where staff members gave short accounts of their current research interests.

Further details can be found in the web archive of the school, at the following address *http://www.ozsl.uva.nl/archive.html*

Communication and Contacts

Publications

The official publications of the institute encompass a series of research reports, a series of Master of Logic theses and a dissertation series. At the end of 2002, the ILLC dissertation series, which has been set up in 1993, contained 78 titles. In 2002, 20 research reports (PP series) and 10 Master of Logic theses (MoL series) appeared. The coordinating editor of these series is Dick de Jongh. Marco Vervoort is the executive editor. All theses and reports can be downloaded from http://www.illc.uva.nl/Publications/ or ordered from the ILLC Bureau. The Applied Logic Lab has its own series of pre-publications, the ALL/CCSOM Prepublication Series. In 2002, 3 new reports appeared. A list of all reports published in 2002 can be found in appendix 2.

Communication and publicity

For internal and external communication and publicity, we use the following media:

- ILLC-list, a weekly electronic newslist (for internal use only);
- The webpages of ILLC: http://www.illc.uva.nl/
- ILLC Magazine: a magazine for alumni
- The annual catalogue of the Graduate Program in Logic.

Colloquia

Regular meetings at which both ILLC-staff, students and visitors meet and exchange ideas and results, are one of the back-bones of the ILLC-community. The following series of colloquia, lectures and workshops, form the core of ILLC's activities in this area. They are complemented by informal meetings on an ad-hoc basis.

- Computing with LLI Seminar, weekly
- The DIP Colloquium (semantics, discourse), bi-weekly
- Logic Tea

Workshops

In 2002, ILLC organized 10 local workshops and other conferences of which an overview can be found in appendix 3.

International Embedding

FoLLI

The Language and Inference Technology group at ILLC provides coordination for the European Association of Logic, Language and Information (FoLLI). During 2002 FoLLI's activities included:

- Organization of the 14th Annual Summer School in Logic, Language and Information, Trento (Italy), August.
- Publication of the FoLLI Newsletter, edited by Alexander Koller (newsletter@folli.org)
- Development of a FoLLI membership program (Raffaella Bernardi)
- Maintenance of the FoLLI and ESSLLI websites
- Sponsoring of the Journal of Logic, Language and Information (JoLLI)
- Sponsoring of a series Studies in Logic, Language and Information (SiLLI) of lecture notes and monographs, published by CSLI
- Sponsoring of scientific events such as WoLLIC
- Supporting the ESSLLI Standing Committee
- Coordinating the E.W. Beth Best Dissertation Award (Natasha Alechina)

In 2002, the Executive Board of FoLLI had the following composition: Hans Uszkoreit (President), Phillipe Blache, Patrick Blackburn (editor-in-chief of the Journal), Dov M. Gabbay John Nerbonne, Jörg Siekmann, Maarten de Rijke (managing editor of the book series and chair Standing Committee).

Feeling the mood

Frank Veltman

Mood & modality

Some of us keep returning to the same topic all their professional life. I, for one, cannot stop wondering about modal expressions like 'may', 'might', 'might have been', and 'must', 'would', 'would have been. I have spent years trying to get to grips with the capricious logical behavior of the phrase 'normally', and presently I find myself once again working on counterfactual assumptions 'If it had been the case that ...', even though I promised myself more than once never to look at them again.

What is so fascinating about these expressions? Well, they keep causing trouble, they never fit in nicely. For me, it started about twenty five years ago - the heydays of Montague Grammar -when I realised that the pair 'may' and 'must' did not behave like any of the diamonds $\Diamond$ and corresponding boxes $\Box$ I knew from standard modal logic. For one thing, a sentence like 'John must have left' seemed to make a weaker claim than 'John has left', whereas in all modal logics $\Box\phi$ is either stronger than ϕ or independent from it. A sentence of the form 'maybe ϕ', on the other hand, seemed much stronger than any of the $\Diamond\phi$ I knew of, since 'It is raining but maybe it isn't' sounded like a contradiction whereas there are no 'normal' modal logics in which $(\phi \wedge \Diamond \neg\phi)$ is contradictory. Therefore, I switched from possible world semantics to something I called 'data semantics' by replacing the complete worlds known from possible worlds semantics by partial worlds, representing the situation the speaker is acquainted with. In data semantics the key definition does not tell when 'ϕ is true in world w' but when 'the information available supports ϕ'. The old notion of truth is considered a limit case of this: a sentence is true if it supported by the information available when this information is complete.

Then, about 15 years ago, I switched from data semantics to update semantics. Now, the trick became to specify how the information available changed when it was updated with a sentence ϕ, and the old notion of support was considered just a fixed point of this operation: the information available supports ϕ if updating it with ϕ does not really add anything. The move from data semantics to update semantics made it possible to study meaning in context. Perhaps the best example here is supplied by phrases of the form 'It would have been the case that ...', which are hard to understand in isolation. But when you meet them in a proper context it is not so difficult any more. Dynamic semantics offers smooth explanations of why the second sentence in:

(1) John did not take any of the apple pie. He would have got sick.

is easy to interpret, whereas the second sentence in

(2) John took some of the apple pie. He would not have got sick.

is plain nonsense unless you put something like 'Otherwise' in front.

Looking back, one can say that with each of these steps - from 'absolute truth' to 'support by the information available' and from there to 'information change' a part of what was previously thought to belong to the domain of pragmatics, was incorporated into semantics. One wonders what the next step will be, and what it will do the borderline between semantics and pragmatics. Some of us have put their hopes on evolutionary game theory, and if they turn out to be right the borderline between semantics and pragmatics will completely vanish.
One nice thing about evolutionary game theory is that it explains how social conventions -and semantic conventions are social conventions - can gradually evolve. Things that are purely pragmatic at first may get institutionalized. So, one might hope evolutionary game theory can account for the evolution, acquisition, and change of conventional meanings.
I think modal expressions offer a rich field for testing these ideas. Let me mention one example. In many languages, English for example, some modalities have both a deontic and an epistemic meaning (Compare: 'John may go', 'John may have left'). Now, in some of these languages, and here Danish is an example, the word used to express epistemic possibility, used to be used for deontic permission as well, but it has gradually got the meaning of deontic obligation. How did that happen? And is there a chance this will happen to English, too? (Note that already in many contexts 'You may go now' is best interpreted as an order).
Another nice thing about evolutionary game theory is that it is not built on the strong rationality assumptions of standard game theory. As such it may offer a suitable theoretical background for the kind of work Luc Steels and his robotics group in Brussels is doing. Indeed, the ongoing 'Talking Heads' experiment is widely considered to have shown the viability of the idea that meaning is not innate, nor learned through stepwise induction from examples and counterexamples, but gradually constructed and practiced as part of situated language games.
Again, here, too, modalities may cause trouble. So far, the kinds of things these robots can say is very limited. They are only able to describe what they see, they are only able to express the kind of things that can be accounted for in a picture theory of meaning. But they haven't invented negation yet, let alone 'may' and 'must' in either their epistemic or their deontic sense. One wonders if the cognitive architecture of these robots can stay as simple as it is now if they have to invent these. I am pretty sure that it cannot. What is needed is that these robots will have to get endowed with 'expectations' — both for the deontic and the epistemic case.
I hope time will tell if I am right about this.

Facts, figures and thoughts

Input

Whereas the total staff grew during 2002 with 16%, the level of permanent staff (full, associate and assistant professors) decreased somewhat, from 16.30 to 15.64 fte. We expect to reach the permanent staff level of 2000 again in 2003, with the appointment of two new assistant professors.

The overall growth of 16% is caused by an increasing number of postdocs and PhD students funded by 'tweede geldstroom' funding agencies (NWO and KNAW): the total number of 'tweede geldstroom' staff increased from 17.31 in 2001 to 25.14 in 2002.

The number of staff funded from so-called 'derde geldstroom' (industry, European funding agencies) stayed at the level of 2001 and is still relatively small: 1.40 fte.

It is worth noting that 7 reseachers, mainly PhD students, funded their own research in 2002.

Human Resource Input 2002	FUNDING	FGW	FMG	FNWI	Total
Full Professor	1	3.50		3.57	7.07
	2				0.00
	3			0.20	0.20
Associate Professor	1	2.50	0.40	2.20	5.10
	2				0.00
	3				0.00
Assistant Professor	1	0.82		2.45	3.27
	2				0.00
	3				0.00
Postdoc	1	0.15			0.15
	2	5.30	1.33	4.71	11.34
	3			0.20	0.20
PhD Student	1	4.13		3.08	7.21
	2	1.26		11.13	12.39
	3			1.00	1.00
Other	1				0.00
	2			1.41	1.41
	3				0.00
Total		17.66	1.73	29.95	49.33

Research Input 2002	FUNDING	FGW	FMG	FNWI	Total
Full Professor	1	1.75		1.78	3.53
	2				0.00
	3			0.10	0.10
Associate Professor	1	1.25	0.30	1.10	2.65
	2				0.00
	3				0.00
Assistant Professor	1	0.31		1.23	1.54
	2				0.00
	3				0.00
Postdoc	1	0.12			0.12
	2	4.24	1.07	3.77	9.08
	3				0.00
PhD Student	1	3.63		2.67	6.30
	2	1.13		10.20	11.33
	3			0.90	0.90
Other	1				0.00
	2			0.20	0.20
	3				0.00
Total		12.43	1.37	21.96	35.75

Output

The number of refereed publications (articles, books, edited volumes) rose slightly, from 149 to 151, an average of 4.3 refereed publications per fte research.

The number of non-refereed publications, such as research reports, decreased. This is partly due to changes in publication patterns: in-house publications, such as research reports and technical reports, are quickly giving way to electronic ways to make research results available.

The number of talks dropped slightly, from 176 in 2001 to 157 in 2002.

All other figures grew (editorships and program committee membership) or remain stable (scientific functions and organization of international events).

Scientific Output 2002	
Refereed publications	146
Edited volumes	5
Technical reports and other publications	24
Dissertations	8
Talks	157
Editorships	40
Program committee memberships	39
Scientific Functions	33
International Events Organized	31

Grants and Awards

NWO

- Benedict Löwe; NWO Visitors Grant
- Michael Masuch en Maarten de Rijke; one Postdoc for research on Organizational Embedding of IT (NWO Science)
- Maarten de Rijke; Open Competition Grant on project 'Model Checking Methods and Tools for Hybrid Logics' (NWO Science)

Miscellaneous

- Balder ten Cate: Best ESSLLI Student Session Paper; Kluwer Academic Publishers, 16 August, Trento.
- Maria Aloni, Beth Dissertation prize Folli, 8 August, Trento Italia.

Feeling the mood

Peter van Emde Boas

Complexity, culture and civilization

Philosophy is an old subject rooted in antiquity. All civilizations including native tribes share ideas on the structure of the world in their conceptual framework. The ILLC incorporates philosophy in its research program and fulfills at least this minimal requirement on being civilized.

Mathematics is a study going back into antiquity as well. The great civilizations of antiquity have produced great mathematics and great mathematicians. The ILLC includes mathematics in its research program so we are on the right track for becoming great.

Physics, chemistry and biology are more recent branches of the great sciences of our times; being out of scope of ILLC I leave them out of consideration here.

Logic as an independent subject has not such a great history, but its roots can be traced into the same cultures of the old ones. So by placing logic in focus we can tap into the tradition of culture that has turned our Society into what it is today.

But then there is this other branch of contemporary science that represents a central theme on our research agenda: computer science (also known as informatics - the phrase sneaked into English with the help of continental Europeans opposed to the practice to assign prevalence to the device rather than to the matter).
The subject is less than a century old - 60 years ago science didn't differentiate between technology and science of computing. Origins of the subject can be traced in mathematics, physics, and logic - as is well known some great logicians are now considered to be the founders of computer science. Still from the perspective of many researchers in the traditional sciences these computer scientists are a problematic community. An unclear domain, ongoing debates on the research agenda, research topics changing by the semi-decade, always attempting to respond to the developments in industry which is jumping from one bandwagon onto the next hype.
They (correctly) believe to be involved in everything. However they are missing an essential ingredient for a stable and well-developed science: history and cultural tradition.

In our society academic education and research represent one of the pillars of our culture. Notwithstanding the fact that today this perspective seems to be replaced by the perspective of academia being a commercial enterprise in the first place, which should generate its own money, I still believe that we should stand for our cultural heritage and should proclaim ourselves to be true men of culture. In the current version of his famous game: Civilization III, Sid Meyer has placed culture and these cultural ingredients in the correct perspective. Breed culture and your opponents will convert to your civilization without use of force. Philosophy and mathematics are technologies from the ancient ages, while physics and chemistry are placed in the medieval times. The scientific method is an invention from the industrial era, whereas computers (without the affix science) are an early technology of the modern age. Of all possible standard improvements (disregarding great and small wonders) it is the University that gives the highest contribution to the growth of culture of a civilization. Too bad that in the 'Play the World' extension the Internet has become a great wonder of the world....
Therefore we should not hesitate to include topics in our curricula on behalf of their cultural value, even if it is hard to demonstrate a direct profit for the students taking such courses.

With several branches of high age and great cultural value on our research agenda the ILLC will be in a perfect position to be a front runner in this battle for culture and against mercantilism, provided we find a way to cope with our wild ones - the computer scientists. But even they might be converted to civilization provided we grant them a culture of their own.

Therefore it is with great pleasure that I can point out some items I found recently in my (traditional) mail, showing that at least some areas in computer science are proceeding towards the stage of exhibiting themselves as realms of culture by the traditional manners.
Some older branches like Logic of Computation or Computation and Complexity Theory have grown into maturity. They have become better focused and stable and are developing a cultural tradition. The researchers work more like mathematicians, with the risk of becoming self-motivated rather than focused on problems of the technology that brought the field into existence. A fate shared by both mathematics and logic.

A clear indication of the progress towards culture is the way computer science is looking at its own past, and its future. The USA based Association of Computing Machinery (ACM) celebrated its 50-th anniversary in 1997; its oldest journal (the

Journal of the ACM) produces volume 50 this year, and its editor, chief Joe Halpern, has used this opportunity to pay a major tribute to history and culture by producing a special 50th Anniversary issue. This issue contains two series of short papers: retrospectives by the past editors (if still alive), and a series of 15 short contributions on great problems for the next 50 years. Of these 15 papers at least 5 involve the great problems of Complexity Theory like P vs. NP, propositional lower bounds and separation of complexity classes. Other challenges relate to AI, Social aspects and the limitations of potential technology. Quantum computing and other physics based computing environments present a challenge to the Church-Turing Thesis and its extensions. Logic bridges the gap between technology (the verification problem) and complexity (lower bounds for combinatorial systems).

Curiously, the preceding issue (vol. 49 number 6) of this journal includes a contribution to culture as well: the publication of a lost paper.

Unpacking this issue I was struck by the title on the front cover: Cosmological Lower Bound on the Circuit Complexity of a Small Problem in Logic. The authors are L. Stockmeyer and A.R. Meyer. The subject sounded quite familiar: wasn't there such a result in Stockmeyer's famous but unpublished MIT thesis from 1974 (L. Stockmeyer: The Complexity of Decision Problems in Automata Theory and Logic; Report MAC TR 133, July 1974). A report that is still present in my office - a witness for culture against the evil forces of oblivion who want to turn our literature into bits and chips. Indeed: as stated in an editorial footnote: And don't blame the editors of the Journal for this late appearance: the relevant dates are Received June 2002, Revised October 2002, Accepted October 2002.

The result itself is one of the classics from the 'pessimistic' era of complexity theory: for the logic WS1S (weak monadic second order theory of one successor) it is shown that deciding the truth for a formula of length 610 (over a 63 character alphabet) requires a Boolean circuit of at least 10125 gates: a number exceeding the number of protons in the Universe both in 1974 and today. These numbers seem to be unchanged - evidently Moore's Law doesn't apply to the Universe as a whole. The result doesn't answer the challenge of providing lower bounds for explicit combinatorial problems (another great challenge of computer science), but it is definitely part of our cultural history, and it is good to have it preserved in the accessible archives rather than the private libraries of old fashioned collectors. True culture cares for its history.

Whenever I am looking for a dispute with my younger colleagues I like to provoke them with the statement that all good things in computer science originate from the 60-ies and 70-ies of the 20-th century. The example shown above almost proves my point. Reason enough to attempt to sneak this result into my ongoing complexity course.

Appendices

Appendix 1: Publications

ILLC Project: Theory of Interpretation

Refereed Publications

M. Aloni. Questions under cover. In D. Barker-Plummer, D. Beaver, J. van Benthem and P. Scotto de Luzio, editors, *Words, Proofs, and Diagrams.* CSLI, Stanford, CA, 2002.

M. Aloni and R. van Rooy. The dynamics of questions and focus. In B. Jackson, editor, *Proceedings of SALT 12*, Cornell Ithaca, NY, 2002.

M. Aloni and R. van Rooy. Topical domain restriction. In D. de Jongh, M. Nilsenova, and H. Zeevat, editors, *Proceedings of Tbilisi symposium*, Tbilisi, 2002.

R. Bartsch. *Consciousness Emerging: The Dynamics of Perception, Imagination, Action, Memory, Thought, and Language*, volume 39 of Advances in Consciousness Research. John Benjamins Publishing Company, Amsterdam-Philadelphia, 2002.

R. Bartsch. Generating polysemy: Metaphor and metonymy. In R. Dirven and R. Pörings, editors, *Metaphor and Metonymy in Comparison and Contrast*, volume 20 of Cognitive Linguistic Research, chapter 1, pages 49-74. Mouton-De Gruyter, Berlin-New York, 2002.

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K.R. Apt. Edsger Wybe Dijkstra (1930 - 2002): A portrait of a genius. *Formal Aspects of Computing*, 14(2):92-98, 2002.

J.P. Bruggeman and I.E. Vermeulen. Competition and differentiation as an evolving network. Working Paper 02-197, CCSOM, 2002.

J.P. Bruggeman and I.E. Vermeulen. Competition, resource dimensions, and specialist proliferation. Working Paper 02-198, CCSOM, 2002.

I.E. Vermeulen. A network representation of competition in industries: Some extensions. Working Paper 02-196, CCSOM, 2002.

ILLC Project: Algorithms and Complexity Theory

Refereed Publications

P. W. Adriaans. Production Control. In: *Handbook of Data Mining and Knowledge Discovery*, pages pg 741-748. Oxford University Press, 2002.

E. Allender, H. Buhrman, M. Kouck, D. van Melkebeek, and D. Ronneburger. Power from random strings. In *Proceedings of the 43rd annual IEEE conference on Foundations of Computer Science*, pages 669-678. IEEE Computer Society Press, 2002.

H. Buhrman and R. de Wolf. Complexity measures and decision tree complexity: a survey. *Theoretical Computer Science*, 288(1):21-43, october 2002.

H. Buhrman and L. Longpre. Compressibility and resource bounded measure. *SIAM Journal on Computing*, 31(3):876-886, February 2002.

H. Buhrman, P.B. Miltersen, and J. Radhakrishnan. Are bitvectors optimal. *SIAM Journal on Computing*, 31(6):1723-1744, November 2002.

M.G. de Graaf and R. de Wolf. On quantum versions of the yao principle. In *Proc 19th Annual Symposium on Theoretical Aspects of Computer Science*, volume 2285 of *Lecture Notes in Computer Science*, pages 247-358, Berlin, 2002. Springer-Verlag.

S. Haldar and P. Vitanyi. Bounded concurrent timestamp systems using vector clocks. *J. Assoc. Comp. Mach*, 49(1):101-123, 2002.

L. Hemaspaandra and L. Torenvliet. *Theory of Semi-Feasible Algorithms.* EATCS Monographs in Theoretical Computer Science. Springer-Verlag, Berlin, 2002.

T. Jiang, M. Li and P. Vitanyi. The average-case area of Heilbronn-type triangles. *Random Structures and Algorithms*, 20(2):206-219, 2002.

M. Li, J. Tromp and P.M.B. Vitanyi. Sharpening Occam's razor. In *Proceedings 8th International Computing and Combinatorics Conference*, volume 2387 of *Lecture Notes in Computer Science*, pages 411-419, Springer Verlag, Berlin, 2002.

M. Li and P.M.B. Vitanyi. Algorithmic complexity. In N.J. Smelser and P.B. Baltes, editors, *International Encyclopedia of the Social & Behavioral Sciences*, pages 376-382. Pergamon, Oxford, 2002.

C. Tagliola, P.W. Adriaans, W. van Aartrijk and M. L. Ai on the ocean: The Robosail project. In F. van Harmelen, editor, *Ecai 2002*, pages pg 653-657. IOS Press, 2002.

J. Tromp and P.M.B. Vitanyi. A protocol for randomized anonymous two process wait-free test-and-set with finite-state verification. In *Pro. 9th International Colloquium on Structural Information and Communication Complexity*, pages 275-292. Carleton University Press, 2002.

P.M.B. Vitanyi. Meaningful information. In *Proc. 13th International Symposium on Algorithms and Computation*, volume 2518 of *Lecture Notes in Computer Science*, pages 588-599, Springer Verlag, Berlin, 2002.

P.M.B. Vitanyi. Simple wait-free multireader register. In *Proc. 16th International Symposium on Distributed Computing*, volume 2508 of *Lecture Notes in Computer Science*, Springer Verlag, Berlin, 2002.

P. Vitanyi and M. Li. Simplicity, information, Kolmogorov complexity and prediction. In A. Zellner, H.A. Keuzenkamp, and M. Mc Aleer, editors, *Simplicity, Inference and Medelling*, pages 135-155. Cambridge University Press, Cambridge UK, 2002.

N.K. Vereshchagin and P.M.B. Vitanyi. Kolmogorov's structure functions and an application to the foundations of model selection. In *Proc 47th IEEE Symposium on the Foundation of Computer Science*, pages 751-760. IEEE Computer Society Press, 2002.

Edited Volumes and Books

P.W. Adriaans, M. van Zaanen and H. Fernau, editors. *Grammatical Inference: Algorithms and Applications*, volume 2484 of LNAI. Springer, 2002.

Dissertations

W.K. van Dam. *On Quantum Computation Theory*, ILLC Dissertation Series DS-2002-04, Amsterdam, 2002.

Y. Engelhardt. *The Language of Graphics*, PhD Thesis, ILLC Dissertation Series DS-2002-01, Amsterdam 2002.

Other Publications

P. W. Adriaans. *Multimedia, Het Gezicht van de Toekomst, op weg naar een perfecte synergie tussen mens en computer.* Next Generation Scenario, Ministerie van Economische Zaken, 2002.

P. W. Adriaans. Backgrounds and General Trends. In: *Dealing with the Data Flood*, pages pg 16-25. STT Beweton, The Hague, 2002.

Appendix 2 Research reports, technical notes and master of logic theses

MoL = Master of Logic Thesis
PP = Prepublication Series

MoL-2002-01:
Seth Cable *Stand Over There, Please: The Dynamics of Vagueness, the Origins of Vagueness, and How Pie-Cutting Relates to Ancient Heaps of Sand.*

MoL-2002-02:
J. Duda *Context and Mythology.*

MoL-2002-03:
W. Conradie *The Beth Property for Three Extensions of Modal Logic.*

MoL-2002-04:
M. Vidal *Classifying Conditionals.*

MoL-2002-05:
B.M. Hernández *Automated Reasoning with Boolean ABoxes.*

MoL-2002-06:
B. Sigurbjörnsson *Structural Properties of Questionnaires.*

MoL-2002-07:
L. Buratto *Back-off as Parameter Estimation for DOP models.*

MoL-2002-08:
M. Counihan *What Do Four-Year-Olds have in common with Frege?*

MoL-2002-09:
R. Singh *A Study of Optimality Theory and the Human Sentence Processing Mechanism.*

MoL-2002-10:
F. Nauze *Scenarios for the Passé Simple and Imparfait: An Event Calculus Approach to French Semantics.*

PP-2002-01:
T. Janssen *Independent Choices and the Interpretation of IF Logic.*

PP-2002-02:
M. Marx, M. *Masuch Regular Equivalence and Dynamic Logic.*

PP-2002-03:
H. Hvid Hansen, M. Pauly *Axiomatising Nash-Consistent Coalition Logic.*

PP-2002-04:
T. Lee *Arithmetical Definability over Finite Structures.*

PP-2002-05:
J. Niekus *Individual Choice Sequences in the Work of L.E.J.Brouwer.*

PP-2002-06:
G. Bezhanishvili, M. Gehrke *A New Proof of Completeness of S4 with respect to the Real Line.*

PP-2002-07:
J. van Benthem, G. Bezhanishvili, M. Gehrke *Euclidean Hierarchy in Modal Logic.*

PP-2002-08:
R. Rajani *Generic Structures.*

PP-2002-09:
M. Gehrke, Hideo Nagahashi, Yde Venema *A Sahlqvist Theorem for Distributive Modal Logic.*

PP-2002-10:
Y. Venema *Duals of subdirectly irreducible modal algebras.*

PP-2002-11:
Y. Venema *Atomless Varieties.*

PP-2002-12:
P. Blackburn, M. Marx *Constructive Interpolation in Hybrid Logic.*

PP-2002-13:
N. van Leusen, R. Muskens *Construction by Description in Discourse Representation.*

PP-2002-14:
C. Areces, M. de Rijke, G. Infante-Lopez *Decomposing Modal Logic.*

PP-2002-15:
C. Areces, J. Heguiabehere *HyLoRes: A Hybrid Logic Prover Based on Direct Resolution.*

PP-2002-16:
C. Areces, H. de Nivelle, M. de Rijke *Resolution in Modal, Description and Hybrid Logic.*

PP-2002-17:
G. D'Agostino, G. Lenzi *On Modal mu-Calculus with Explicit Interpolants.*

PP-2002-18:
N. Bezhanishvili *Varieties of Two-Dimensional Cylindric Algebras. Part II.*

PP-2002-19:
R. Bod, R. Kaplan *A Data-Oriented Parsing Model for Lexical-Functional Grammar.*

PP-2002-20:
G. Corsi *Counterpart Semantics. A Foundational Study on Quantified Modal Logics.*

Appendix 3 Workshops, events

Workshops

Exchange on Logic and Games (Amsterdam Aachen)
Location: Amsterdam
Date: 15 februari 2002
Organization: J. van Benthem P. van Emde Boas, W. Thomas

First Seminar Cognitive Science Center Amsterdam (CSCA)
Location: Amsterdam
Date: 18 February 2002
Organization: M. van Lambalgen

Second Utrecht-Amsterdam Workshop, Computational Tools for Linguistics
Location: Utrecht
Date: 8 March 2002
Organization: J. van Benthem and M. Moortgat

Games in Logic, Language and Computation 6
Location: Utrecht
Date: 20 June 2002
Organization: B. de Bruin, B. ten Cate, P. Harrenstein, W. van den Hoek, J.J. Meyer

Games in Logic, Language and Computation 7
Location: Amsterdam
Date: 28 November 2002
Organization: J. van Benthem, B. de Bruin

6th International Colloquium on Grammatical Inference
Location: Amsterdam
Date: 23-25 September 2002
Organization: P. Adriaans, M. van Zaanen, H. Fernau

OzsL Schoolweek
Location: Amsterdam
Date: 14-18 October 2002
Organization: J. van Eijck, E. Hoogland

Interpolation in Hybrid Logic
Location: Amsterdam
Date: 25 October 2002
Organization: B. ten Cate

Meaning and Intonation
Location: Utrecht
Date: 19 November 2002
Organization: M. Nilsenova

Finite Model Property for Guarded Fragments
Location: Amsterdam
Date: 2 December 2002
Organization: Y. Venema

Regular Events

The DIP Colloquium
The Discourse Colloquium (DIP) is held every two weeks at the University of Amsterdam, Departments of Philosophy and Linguistics. The colloquium aims to bring together researchers and students who are interested in discourse analysis and to encourage discussion, collaboration and cross-fertilization of ideas. The main topic is the interpretation of utterances in their (textual) context. The orientation of the colloquium is quite broad: the talks may focus on semantics, pragmatics, prosody, or even syntax. The DIP homepage can be found at *http://www.illc.uva.nl/dip/*
Organization: B. ten Cate, M. Nilsenova

The Logic Tea
The Logic Tea, a series of one-hour talks designed for students of mathematics, computer science, artificial intelligence, and philosophy, and the students of the Master of Logic program of the ILLC, with discussion, tea and cookies afterwards. The Logic Tea homepage can be found at *http://staff.science.uva.nl/~debruin/logic_tea.html*.
Organization: B. de Bruin, M. Theunissen

The Computing with LLI Seminar
The Computing with LLI Seminar (formerly the Computational Logic Seminar), an almost bi-weekly series of talks that focuses on a wide variety of themes in computational logic and computational linguistics. The Computing with LLI Seminar homepage can be found at *http://lit.science.uva.nl/News/seminar.html*.
Organization: J. Kamps, M. de Rijke

Appendix 4 Other contributions

ILLC Project: Theory of Interpretation

Principal Researchers
M.D. Aloni, R.I. Bartsch, E.C. Brouwer, A.J.B. Butler, B.D. ten Cate, P.J.E. Dekker, J.A.G. Groenendijk, H.L.W. Hendriks, T.M.V. Janssen, J. Maat, M. Nilsenova, R.A.M. van Rooy, M.J.B. Stokhof

Lectures

- M.D. Aloni, *Questions and Focus in Dynamic Semantics*, SALT12, 9 March 2002, San Diego, CA; *Pragmatics in Optimality Theory: A Case*, ESSLLI Workshop Pragmatics in OT, 15 August 2002, Trento, Italy; *Free Choice in Modal Contexts*, Sinn und Bedeutung 7, 4 October 2002, Konstanz, Germany.

- E.C. Brouwer, *Reflection and Imagination: A Kantian Analysis of Metaphorical Interpretation*, EURESCO: Mind, language and metaphor, 20 April 2002, Kerkrade, Holland.

- A.J.B. Butler, *Licensing Polarity Sensitive Expressions: An Interface Story*, Amsterdam - Utrecht workshop on negative polarity items, 26 April 2002, University of Amsterdam; *The Can Do and Is of Exhaustification and 'Only'*, One day 'Only', 10 May 2002, University of Amsterdam; Herding in Natural Language, Games in Logic, Language and Computation 6, 20 June 2002, University of Utrecht; *(De)-Accenting and BidirectionalOptimality*, Pragmatics in OT workshop, 15 August 2002, University of Trento, Italy; *Information Cascade in Natural Language*, Pragmatics in OT workshop, 16 August 2002, University of Trento, Italy; *Negation Float in Korean*, The Seventh Symposium on Logic and Language, 27 August 2002, University of Pécs, Hungary; *Licensing Polarity Sensitive Items: An interface story*, LAGB Autumn 2002 Meeting, 18 September 2002, University of Manchester, UK; *Locality Contrasts and Rebinding*, Sinn und Bedeutung VII, 5 October 2002, University of Konstanz.

- B.D. ten Cate, *Epistemic Actions*, TCS Seminar (VU Amsterdam), 11 January 2002, Amsterdam; *A Hybrid Logic of Epistemic Actions*, The Logic of Rational Agency, 25 January 2002, Dagstuhl; *From Partitions to Prolog*, LED seminar (Loria), 7 March 2002, Nancy; *On the Logic of D-separation*, Knowledge Representation and Reasoning KR'02, 23 April 2002, Toulouse; *Internalizing Epistemic Actions*, NASSLLI Student Session, 29 June 2002, Stanford; *Beyond Pure Axioms: Node Creating Rules in Hybrid Tableaux*, HyLo 2002, 25 July 2002, Copenhagen; *Question Answering: from Partitions to Prolog*, Natural Language Understanding and Logic Programming NLULP-2002, 28 July 2002, Copenhagen; *Natural Deduction for Epistemic Actions*, Seminaire de philosophie formelle (IHPST), 18 November 2002, Paris; Natural Deduction for Epistemic Actions, Logic and Games workshop GLLC-7, 28 November 2002, Amsterdam.

- P.J.E. Dekker, *Surprising Semantics*, Stockholm Seminar, 4 June 2002, Stockholm; *Topical Restriction*, Seventh Symposium on Logic and Language, 27 August 2002, Pécs; *A Conservative Natural Language Semanticist's Point of View*, Dynamica 4, 8 October 2002, Amsterdam; *Deconstructing Answerhood*, Sinn und Bedeutung VII, 5 October 2002, Konstanz; Extensional Satisfaction, Information Structure, 11 November 2002, Amsterdam; *Donkeys in 3D and Maybe Something Else*, Information Structure in Context, 17 November 2002, Stuttgart.

- J. Maat, *Dalgarno and Leibniz: Two Conceptions of Logicality*, Henry Sweet Society Annual Colloquia, 13 April 2002, Oxford, UK; *Dalgarno and Leibniz on the Particles*, 9th International Conference on the History of the Language Sciences, 27 August 2002, Sao Paulo, Brasil; *Parts of Speech, Particles, and Parsers: Challenges in the Computer Implementation of a 17th-century Artificial Language*, Linguistics Graduate Seminar, 18 November 2002, Oxford, UK.

- M. Nilsenova, *On Differential Subject and Object Marking: Western Armenian Evidence*, The 19th Scandinavian Conference on Linguistics, January 2002, Tromsoe, Norway; *A Game-theoretical Approach to Intonation*, Speech Prosody, April 2002, Aix-en-Provence, France; *The Pragmatics of Differential Object Marking*, ESSLLI '02 Student Session, August 2002, Trento, Italy; *The Difference between Positive Polar Questions and Negative Polar Questions*, Pragmatics in OT Workshop, August 2002, Trento, Italy; *NO is no good Alternative*, Information Structure in Context, November 2002, Stuttgart, Germany (with R. van Rooy); *The Meaning of Boundary Tones in Rising Declaratives*, Amsterdam-Utrecht workshop on the Meaning of Intonation, November 2002, Utrecht, The Netherlands.

- R.A.M. van Rooy, *Optimality Theory and Game Theory*, LOT Winter School, 16 January 2002, Leiden; *Negative Polarity Items in Questions*, A'dam/Utrecht workshop on NPIs, 8 May 2002, *Amsterdam; Utility,*

Informativity and Protocols, LOFT 5, 16 June 2002, Torino; *No is no good Alternative*, Workshop on Information structure, 10 November 2002, Stuttgart (with M.Nilsenova); *The Dynamics of Questions and Focus*, SALT 12, 5 April 2002, New York.

- T.M.V. Janssen, *Basic Properties of IF-logic*, Philosophical Insights into Logic and Mathematics, 10 October 2002, Nancy.

Scientific Functions

M.J.B. Stokhof, *Onderzoekschool Logica OZSL*, Member of the Board.
B.D. ten Cate, *Nederlandse Vereniging voor Logica en Wijsbegeerte der Exacte Wetenschappen*, Member of the Board.

Editorships

M.J.B. Stokhof, *Linguistics and Philosophy*, Associate Editor Semantics; *Natural Language Semantics*, Member Editorial Board; *Language and Computation*, Member Editorial Board; *Current Research on the Semantics Pragmatics Interface*, Member Editorial Board.

P.J.E. Dekker, *Journal of Semantics*, Member Editorial Board; *Linguistics and Philosophy*, Associate Editor Semantics.

Program Committees

M.J.B. Stokhof, *Semantics and Linguistic Theory XII*, Member Program Committee, 8 March - 10 March 2002, San Diego, USA.
R.I. Bartsch, *Nederlands-Vlaamse Filosofiedag 2002*,Member Program Committee, 2 November 2002, Amsterdam.

Scientific Events Organized

R.I. Bartsch, *Nederlands-Vlaamse Filosofiedag 2002*, 2 November 2002, Amsterdam.

A.J.B. Butler, *One Day Only* (with P. Dekker, H. Zeevat), 10 May 2002, University of Amsterdam.
B.D. ten Cate, *Sixth Workshop on Logic and Games* (GLLC6) (with B. de Bruin, P. Harrenstein, W. van der Hoek and J. J. Meyer.), 20 June 2002, Utrecht; OZSL *Accolade Student Workshop 2002* (with E. Hoogland), 14 October 2002, Amsterdam.

P.J.E. Dekker, *One Day Only* (with A. Butler, H. Zeevat), 10 May - 10 May 2002, Amsterdam; *Seventh Symposium on Logic and Language* (with G. Alberti, K. Balogh), 26 August - 29 August 2002, Pécs; *Information Structure*, 11 November - 12 November 2002, Amsterdam.

M. Nilsenova, *Polarity Item Workshop* (with O. Nilsen), April - April 2002, Amsterdam; *Language Evolution Workshop* (with H. Zeevat), June - June 2002, Amsterdam; R.A.M. van Rooy, *Meaning and Intonation* (with R. Nouwen), 19 November - 19 November 2002, Utrecht.

Scientific Awards

B.D. ten Cate, *Best ESSLLI Student Session Paper*, Kluwer Academic, 16 August 2002, Trento.
M.D. Aloni, Beth Dissertation prize, Folli, 8 August 2002, Trento Italia.

Miscellaneous Scientific Functions or Activities

R.I. Bartsch, Member Bestuur Raad voor de Geesteswetenschappen, KNAW; Member Commissie onderzoeksscholen, KNAW; Member Commissie Nederlands als Wetenschapstaal, KNAW; Member Klankbordgroep VWO, KNAW

P.J.E. Dekker, Guest editor with M. Pauly of the special issue on Logic and Games of the Journal of Logic, Language and Information, 11/3, 2002; One week course 'Dynamics, Semantics, Pragmatics', first North American Summer School on Logic, Language and Information, Stanford, June, 2002; One week course (with R. van Rooy) 'Dynamic Semantics, Games and Optimality', 14th European Summer School on Logic, Language and Information, Trento, August 2002

ILLC Project: Cognitive Systems and Information Processing

Principal Researchers

R.B. Blutner, R. Bod, M.E. Counihan, H.F. Fitz, H. Honing, A.K. Honingh, K.L. Kwast, M. van Lambalgen, R.J. Mastop, R.J.H. Scha, K. Sima'an*, N. Spiro, F.J.M.M. Veltman, M.M. van Zaanen, H.W. Zeevat

Lectures

- R.B. Blutner, *Optimality Theory and Natural Language Interpretation*, Semantics Colloquium, 19 February 2002, Nijmegen; *Nonmonotonic Inference and Neural Networks*, NASSLLI Workshop on Cognition, 30 June 2002, Stanford; *Optimality and Interpretation*, Workshop on variations in form versus variation in meaning, 12 July 2002, Nijmegen; *Signalling Games: How Evolution Selects Optimal Strategies*, Philosophy Day, 2 November 2002, Amsterdam; *Optimalitätstheorie und Pragmatik*, Arbeitstreffen Linguistische Pragmatik, 25 February 2002, Mannheim.

- R. Bod, A *General Parsing Model for Language and Music*, International Conference on Music and AI (ICMAI'02), 19 September 2002, Edinburgh; *Minimalism vs. Maximalism in Natural and Social Sciences*, CENSS'02, 17 May 2002, Ghent; *Statistical Parsing with LFG-DOP*, Linguistic Corpora and Logic Based Grammar Formalisms, 27 November 2002, Utrecht.

- H. Honing, *Modeling Rhythm Perception and Quantization*, MMM colloquium, Music and AI Group, 26 November 2002, University of Edinburgh, UK; *Rhythm and Timing: A Cognitive Approach*, Music Cognition Series, 8 December 2002, New York University, USA.

- R.J. Mastop, *Permission and Social Dependency: A Formal Approach*, NASSLLI Student Session, 29 June 2002, Stanford; *Strong Permission in Coalition Logic*, GLLC 6, 20 June 2002, Utrecht.

- R.J.H. Scha, *Artificial Art*, Media Massage Symposium, 19 April 2002, De Proosdij, Zwolle; *Artificial Art*, The Boundaries between Art and Science, 30 May 2002, Leyden University; *Data-Oriented Semantics?*, Linguistic Corpora and Logic Based Grammar Formalisms, 27 November 2002, University of Utrecht.

- K. Sima'an, *Empirical Validity and Technological Viability*, Formal Grammar 2002 and CologNET Symposium, 4 August 2002, Trento, Italy; *Linguistic Metrics and Optimal Parsing Algorithms*, University of Maryland Institute for Advanced Studies Colloqium, 13 November 2002, Washington DC, USA.

- N. Spiro, *Combining Brammar-Baed and Memory-Based Models of Perception of Time Signature and Phase*, Second International Conference for Music and Artificial Intelligence, 14 September 2002, Edinburgh, UK.

- M. van Lambalgen, *'After all, there's nothing particularly complicated about the conditional ...'; logic and the psychology of reasoning.* Dept. of Psychology, Leuven University, January 2002; *Time and tense.* Dept. of Philosophy, Leuven University, January 2002. *Semantics and cognition.* Course at ESSLLI02, Trento, Italy (with Keith Stenning). *Event calculus, tense and nominalization.* Course at ESSLLI02, Trento, Italy (with Fritz Hamm).

- F.J.M.M. Veltman, *Making Counterfactual Assumptions*, NASSLI Workshop on Modals and Conditionals, 29 June 2002, Stanford, CA; *The Counterfactual Mood*, Seminar on Modality, 29 August 2002, Copenhagen, Denmark.

- M.M. van Zaanen, *Implementing Alignment-Based Learning*, International Colloquium on Grammatical Inference (ICGI), September 2002, Amsterdam; *Context-Sensitive Spelling Correction and Machine Learning*, International Symposium on the Development of Spelling Checkers for Southern African Languages, March 2002, Potchefstroom (South Africa).

Scientific Functions

R. Bod, *MacArthur Foundation (USA)*, Member of Review board MacArthur Fellows program; *Engineering and Physical Sciences Research Council (UK)*, Member of Peer Review College.

M.M. van Zaanen, *International Community on Grammar Induction*, Communication Officer.

• K. Sima'an first worked in the LIT project for a period of 6 months and continued in the CSIP project. For editorial reasons the output of his work in 2002 has been placed within the CSIP project.

Editorships

H. Honing, *Journal of New Music Research (JNMR)*, Advisory Editor.

R.B. Blutner, *Linguistics and Philosophy*, Member Editorial Board.

H.W. Zeevat, *Journal of Semantics*, Member Editorial Board.

F.J.M.M. Veltman, *Argumentation*, Member Editorial Board; *Journal of Applied Non-Classical Logics*, Member Editorial Board.

M. van Lambalgen, *Journal of Logic, Language and Information*, Editor.

Program Committees

R. Bod, *Machine Learning Approaches in Computational Linguistics*, Member of Program Committee, 5 August - 9 August 2002, ESSLLI'2002, Trento; *2nd International Conference on Music and Artificial Intelligence* (ICMAI'02), Member of Program Committee, 17 September - 19 September 2002, Edinburgh; *Quantitative Investigations in Theoretical Linguistics (QITL)*, Member of Program Committee, 3 October - 5 October 2002, Osnabrueck; *Linguistic Knowledge Acquisition and Representation: Bootstrapping Annotated Language Data*, Member of Program Committee, 26 May 2002, Las Palmas.

H. Honing, *Journées d'Informatique Musicale (JIM)*, Scientific committee, 29 May - 31 May 2002, Marseile, France; *International Conference of Music and Artificial Intelligence (ICMAI)*, Scientific Committee, 12 September - 15 September 2002, Edinburgh, England.

K. Sima'an, *Traitement Automatique Des Langues Naturelle 2002*, Program Committee Member and Reviewer, 24 June - 27 June 2002, Nancy, France; *Beyond PARSEVAL: A Workshop of the LREC 2002 Conference*, Program Committee Member and Reviewer, 2 June 2002, Las Palmas (GC), Spain.

F.J.M.M. Veltman, BNAIC' 02, Member Program Committee, 1 November - 2 November 2002, Kaatsheuvel.

M.M. van Zaanen, LREC *Workshop on Linguistic Knowledge Acquisition*, Reviewer, 1 June 2002, Las Palmas.

H.W. Zeevat, *Edilog*, member, 2 September - 5 September 2002, Edinburgh.

Scientific Events Organized

R.B. Blutner, *Third Workshop on the Roots of Pragmasemantics*,(with H. Zeevat, A. Pilatova), 2 March - 6 March 2002, Szklarska Poreba (Poland); *Workshop Optimality Theory and Pragmatics*, (with A. Strigin, H. Zeevat), 8 June - 10 June 2002, Berlin, Germany; *ESSLLI Workshop Pragmatics in OT*, (with H. Zeevat), 12 August - 16 August 2002, Trento, Italy.

M.M. van Zaanen, *International Conference on Grammatical Inference* (with P. Adriaans, H. Fernau), 23 September - 25 September 2002, Amsterdam.

Visiting Professorships

H. Honing, *New York University (NYU)*, USA, December 2002 - January 2003.

K. Sima'an, *UMIACS, University of Maryland*, College Park, USA, October 2002 - November 2002.

H.W. Zeevat, *Linguistik, Universitaet Potsdam*, April 2002 - July 2002.

R.J.H. Scha, F*rank Mohr Institute, Groningen*, May 2002 - May 2002.

M. van Lambalgen, *Seminar fuer Sprachwissenschaft, Universitaet Tuebingen*, April 2002 ; *Human Communication Research Center*, Edinburgh, June 2002; Institute of Education, University of London, November 2002 .

Miscellaneous Scientific Functions or Activities

H. Honing, Member MOSART EU Fifth Framework-IHP Network (HPRN-CT-2000-00115), European Network on Music Technology.

M. van Lambalgen, Two lecture series at ESSLLI02 in Trento (August 2002): - (with F. Hamm), Event semantics - (with K. Stenning), Semantics and Cognition; Popular lecture for The Hague Society for Philosophy: Evolution and higher cognition (December 2002); Popular lecture in the IP3 Lecture series for gifted students: Time (December 2002)

M.M. van Zaanen, Invited lecturer and consultant at the Potchefstroomse Universiteit vir Christelike Hoër Onderwys (Potchefstroom, South Africa); Practical help with the Computational Linguistics in the Netherlands Conference (Groningen, 29 November)

ILLC Project: Constructive and Intensional Logic

Principal Researchers

M. Aiello, J.F.A.K. van Benthem, N. Bezhanishvili, B.P. de Bruin, H.C. Doets, D.J.N. van Eijck, A. Hendriks, D.H.J. de Jongh, C.A. Kupke, J.M. Niekus, Y. Seginer, Y. Venema

Lectures

- M. Aiello, Thick 2D *Allen Relations for Document Understanding*, DeDuGIS meeting, 24 April 2002, Amsterdam.

- J.F.A.K. van Benthem, *Logical Structures in Games*, Multi-Agents, Games and Logic, 21 January 2002, Dagstuhl; *The Future of the Humanities and Sciences*, Hollandsche Maatschappij der Wetenschappen, 16 February 2002, Haarlem; *One is a Lonely Number*, Colloquium Logicum, 25 August 2002, Muenster; *From Reasoning to Communication*, Distinguished ITC-IRST Lecture, 18 September 2002, Trento; *The Varieties of Reasoning*, Bolzano Workshop, 18 October 2002, Vienna; *Rational Dynamics*, LOGAMAS Workshop, 16 December 2002, Liverpool.

- N. Bezhanishvili, *Normal extensions of S5-square*, Seminar in Mathematical Logic of L'Universite de Mons-Hainaut, 16 May 2002, Brussels; *Projective Formulas in Two Variables in Intuitionistic Propositional logic*, Logic Colloquium 2002, 3 August 2002, Muenster; *Automorphisms of the Lindenbaum-Tarski Algebra of Intuitionistic Logic*, Annual Ph.D conference organized by OZSL, 14 October 2002, Amsterdam; *Two-Dimensional Cylindric Algebras*, GLLC seminar, King's College, 29 November 2002, London.

- B.P. de Bruin, *Backwards Induction*, Seminar The Logic of Rational Agency, 22 January 2002, Dagstuhl; *Sur le Paradoxe de L' Induction à Rebours*, Logique et Rationalité, March 2002, Paris; *Subgame Perfection in Propositional Dynamic Logic*, Dept. of Comp. Sci., Liverpool, 14 May 2002, Liverpool; *On a Paradox of Backwards Induction*, Fourth European Congress for Analytic Philosophy, June 2002, Lund; *A Characterization of Backward Induction and Sequential Equilibrium in Propositional Dynamic Logic*, Fifth Conference on Logic and the Foundations of Game and Decision Theory, 30 June 2002, Turin; *Popper's Conception of the Rationality Principle in the Social Sciences*, Karl Popper 2002 Centenary Congress, July 2002, Vienna; *We and the Plural Subject*, Collective Intentionality III, 15 December 2002, Rotterdam.

- D.J.N. van Eijck, *Quantification and Reference in Incremental Processing*, Conference on (Preferably) non-lexical semantics, 14 June 2002, Paris; *Context and the Composition of Meaning*, 7th Symposium on Logic and Language, 28 August 2002, Pécs, Hungary; *Computational Semantics, Type Theory and Functional Programming*, 7th Symposium on Logic and Language, 26 August 2002, Pécs, Hungary.

- D.H.J. de Jongh, *The Master of Logic Program of the ILLC*, Workshop on Education & Training of Work Package 12 of CologNet, 20 September 2002, Madrid.

- C.A. Kupke, *(Co-)Algebraic Semantics of Modal Logic*, ACG seminar at the CWI, 8 October 2002, Amsterdam.

- J.M. Niekus, *Individual Choice Sequences in the Work of L.E.J.Brouwer*, PILM 2002, 30 September 2002, Nancy.

- Y. Seginer, *Fast Learning from Strings of 2-Letter Rigid Grammars*, ICGI-2002, 25 September 2002, Amsterdam.

- Y. Venema, *Game Logic and Game Algebra*, Seminar Department of Computer Science, 20 February 2002, Manchester; *Canonicity, Correspondence, and Duality*, Colloquium on Mathematical Logic, 19 April 2002, Utrecht; *Subdirect Irreducibility (from a dual perspective)*, 'Logic, Algebra, Relativity - 2002': Conference dedicated to the work of István Németi, 5 November 2002, Budapest.

Scientific Functions

D.J.N. van Eijck, *Dutch Research School in Logic*, director; Nederlandse Vereniging voor Logica, secretaris.

J.F.A.K. van Benthem, *Academia Europaea*, Member; *Royal Dutch Academy of Sciences*, Member; *Institut International de Philosophie*, Member; *Hollandsche Maatschappij van Wetenschappen*, Member; *Reasoning About Knowledge and Rationality*, Board of directors; *International Federation for Computational Logic*, Vice-president; *Vienna Circle Archive*, President; *E.W. Beth Foundation*, *Treasurer.*

Editorships

J.F.A.K. van Benthem, *The Philosopher's Annual*, Nominating Editor; *Journal of Philosophical Logic*, Member Editorial Board; *Studia Logica*, Member Editorial Board; *Studies in Logic and Practical Reasoning*, Managing Editor; *Journal of Applied Logic*, Member Editorial Board; *Studies in Linguistics and Philosophy*, Member Editorial Board; *Logic Journal of the Interest Group in Pure and Applied Logics*, Editor; *Logic and Computation*, Member Editorial Board; *Language and Computation*, Member Editorial Board.

M. Aiello, *ACM Transactions on Computational Logic*, Information Director.

Program Committees

J.F.A.K. van Benthem, *TIME 2002*, Member Program Committee, 2 July - 6 July 2002, Manchester; *Logic & Language 7*, Member Program Committee, 13 August - 17 August 2002, Pécs; IMLA 2002, Member Program Committee, 8 July - 11 July 2002, Copenhagen; *Philosophical Insights into Logic and Mathematics*, Member Program Committee, 23 September - 28 September 2002, Nancy.

D.H.J. de Jongh, *ICGI*, Member, September 2002, Amsterdam.
Y. Venema, *Ninth International Symposium on Temporal Representation and Reasoning*, Member of Program Committee, 7 July - 9 July 2002, Manchester.

Scientific Events Organized

B.P. de Bruin, *24ste Nederlands-Vlaamse Filosofiedag*, with R. Bartsch, R. Beentjes, K. van der Leeuw, 24 November 2002, Amsterdam; *Games in Logic*, Language, and Computation VI, with P. Harrenstein, 21 June 2002, Utrecht; *Workshop on Updates*, 8 October 2002, Amsterdam.

D.J.N. van Eijck, *OzsL Schoolweek 2002*,with Eva Hoogland, 14 October - 18 October 2002, Amsterdam.

J.F.A.K. van Benthem, *First North-American Summer School*, program director, with D. Sarenac and A. Yap, 24 June - 1 July 2002, Stanford; *Workshop Games, Logic and Computation*, with Co-organizer with Y. Shoham, 24 June - 1 July 2002, Stanford; *Workshop Games, Logic and Computation*, with Co-organizer with Y. Shoham, 24 June - 1 July 2002, Stanford.

Visiting Professorships

J.F.A.K. van Benthem, *Stanford University, Department of Philosophy*, April 1991 - June 2004.

M. Aiello, *DIT, Univ. of Trento*, March 2002 - December 2002.

Miscellaneous Scientific Functions or Activities

D.J.N. van Eijck, Chairman of the VSNU Visitation Committee for Artificial Intelligence (Fall 2001 and Spring 2002)

ILLC Project: Language and Inference Technology

Principal Researchers

K.R. Apt, C.E. Areces, S. Brand, C. Caracciolo, M. Franceschet, R. Gennari, W.R. van Hage, J.M. Heguiabehere, W.J. van Hoeve, G.J. van der Hoeven, V. Hollink, G.G. Infante-Lopez, V. Jijkoun, J. Kamps, J.M.F. Masuch, M.J. Marx, R.J. Mokken, C. Monz, G.A. Musillo, B.Ó Nualláin, N.S. Poelsma, M. de Rijke, S. Schlobach, B. Sigurbjörnsson, M.C. Stol, I.E. Vermeulen,

Lectures

- K.R. Apt, *Constraint programming*, 5 lectures between 14-20 April 2002, University of Udine.

- C.E. Areces, *Concrete Domains and Nominals United*, HyLo@LICS'02, 25 July 2002, Copenhagen, Denmark; *HyLoRes: a hybrid logic prover based on direct resolution*, AiML'02, 30 September 2002, Toulouse, France; *HyLoRes: a hybrid logic prover based on direct resolution*, BNAIC'02, 21 October 2002, Leuven, Belgium.

- C. Caracciolo, *Building an Ontology for Logic and Language*, Second Utrecht-Amsterdam Workshop, 8 March 2002, Utrecht; *Towards Modular Access to Electronic Handbooks*, workshop 'E-books + E-readers + E-journals = E-education?' within the European Conference on Digital Libraries (ECDL2002), 19 September 2002, Rome; *Towards Scientific Information Disclosure Through Concept Hierarchies*, International Conference on Electronic Publishing, 8 November 2002, Karlovy Vary (CZ).

- R. Gennari, *Constraint Satisfaction Made Easy*, Invited talk, 12 April 2002, CS Trento; *Constraint Satisfaction and Propagation*, Invited talk, 13 May 2002, IRST Trento.

- J.M. Heguiabehere, *The Random Modal QBF Test Set*, Theoretical Computer Science Seminar, 1 February 2002, Vrije Universiteit, Amsterdam; *HyLoRes 1.0: Direct resolution for hybrid logics*, CADE 18, 27 July 2002, Copenhagen, Denmark; Direct Resolution for Modal-like Logics, Third International Workshop on the Implementation of Logics, 18 October 2002, Tbilisi,

  Georgia; *Pre- and Postcondition Reasoning in Dynamic First Order Logic*, LPAR 2002, 18 October 2002, Tbilisi, Georgia.

- W.J. van Hoeve, *Reduced cost-based ranking for generating promising subproblems*, Joint ERCIM/CologNet Workshop on Constraint Solving and Constraint Logic Programming, 19 June 2002, Cork (Ireland); *Reduced cost-based ranking for generating promising subproblems*, Eighth International Conference on Principles and Practice of Constraint Programming, 12 September 2002, Ithaka (USA).

- J. Kamps, *Words with Attitude*, 1st International Conference on Global WordNet, 22 January 2002, Mysore, India; *Visualizing WordNet Structure*, 1st International Conference on Global WordNet, 24 January 2002, Mysore, India; *The Structure of Meaning*, International Sunbelt Social Network Conference XXII, 14 February 2002, Utrecht; *The Structure of Meaning*, Second Amsterdam-Utrecht Workshop: Computational Tools for Linguistics, 8 March 2002, Utrecht; *Notions of Indistinguishability for Semantic Web Languages*, First International Semantic Web Conference, 10 June 2002, Sardinia, Italy; *Exploiting Keyword Structure for Domain-Specific Retrieval*, Cross-Language Evaluation Forum 2002, 20 September 2002, Rome, Italy; *Words with Attitude*, Belgium-Netherlands Conference on Artificial Intelligence, 20 October 2002, Leuven; *Exploiting Structure for Information Retrieval*, 3rd Dutch-Belgian Information Retrieval Workshop (DIR-2002), 6 December 2002, Leuven; *The University of Amsterdam at INEX 2002*, Initiative for the Evaluation of XML Retrieval (INEX), 9 December 2002, Dagstuhl.

- J.M.F. Masuch, *Radarset Decomposition Using Directional Filters*, Protection and Restoration of the Environment, 5 July 2002, Skiathos, Greece; *Spatial Classification Techniques for Synthetic Aperture Radar*, AGU Fall Meeting, 8 December 2002, San Francisco.

- G.A. Musillo, *Towards comparing parsers from different frameworks : an information-theoretic appraoch*, LREC, Beyond Parseval Workshop, 29 May 2002, Las Palmas, Spain.

- M. de Rijke, *Evaluate!*, ILLC double talks, January 2002, Amsterdam; *Computing with Meaning*, CLLI Seminar, February 2002, Amsterdam; *Computing with Meaning*, Seminar, March 2002, Manchester; *Towards a test set for inference in computational semantics*, Seminar, April 2002, Amsterdam; *FoLLI: The State of Things*, ESSLLI/FoLLI lecture, August 2002, Trento; *Language and Inference Technology*, ICT-Kenniscongres, September 2002, Den Haag; Combining *Morphological and Ngram Evidence for Monolingual Retrieval*, CLEF 2002, September 2002, Rome; *Decomposing Modal Logic*, AiML, October 2002, Toulouse; *Knowledge-Intensive Question Answering*, BNAIC'02, October 2002, Leuven.

- S. Schlobach, *Knowledge Discovery in Description Logics*, LIT seminar, ILLC, 19 April 2002, Amsterdam.

Scientific Functions

K.R. Apt, *Association for Logic Programming*, President; *ERCIM Working Group on Constraints*, Chairman and co-founder; Board of the International Federation for Computational Logic (IFCoLoG), Member of the Board.

M. de Rijke, *Advances in Modal Logic*, President; *European Association for Logic, Language and Information (FoLLI)*, Chief Executive Officer; *Standing committee of the European Summer School in Logic, Language, and Information (ESSLLI)*, Chair; *Inference in Computational Semantics (ICOS)*, Member of the steering committee; *Methods for Modalities*, Member of the steering committee; *NWO-VIDI evaluation committee*, Member; *Cross-Language Evaluation Forum/QA Task*, Dutch coordinator; *CologNet*, Sit coordinator for LIT/ILLC.

Editorships

K.R. Apt, *ACM Transactions on Computational Logic*, Editor-in-Chief and founder; *Journal of Logica and Computation*, Editor; *Theory and Practice of Logic Programming*, Editor.

M. de Rijke, *ACM Transactions on Computational Logic*, Editor; *Journal of Logic, Language and Information*, Book Review Editor; *Journal of Language and Computation*, Editor; *Studies in Logic, Language and Information*, Managing Editor.

J.M.F. Masuch, *Computational & Mathematical Organization Theory*, Area Editor.

Program Committees

K.R. Apt, *29th Annual ACM SIGPLAN-SIGACT Symposium on Principles of Programming Languages*, January 2002, Portland.

M. de Rijke, *Advances in Modal Logic 2002 (AiML)* (Member of the PC), October 2002, Toulouse; *Computer Aided Deduction (CADE)*, Member of the PC, July 2002, Copenhagen; *International Semantic Web Conference (ISWC)*, Member of the PC, June 2002, Sardinia, Italy; *Formal Grammar (FG)*, Member of the PC, August 2002, Trento; *Belgium-Netherlands Artificial Intelligence Conference (BNAIC)*, Member of the PC, October 2002, Leuven.

C.E. Areces, *HyLo@LICS 4th Workshop on Hybrid Logics*, Co-chair, 15 July 2002, Copenhagen, Denmark; *1st European Starting AI Researcher Symposium*, Member of the PC, 22 July - 23 July 2002, Lyon, France; *ESSLLI 2002 Student Session* (member of the PC), 5 August - 16 August 2002, Trento, Italy.

Scientific Events Organized

C. Caracciolo, *workshop: Computational Tools for Linguistics*, with Paola Monachesi, 8 March 2002, Utrecht.

J.M. Heguiabehere, *ESSLLI Student Session* with Malvina Nissim, Marta García-Matos, David Ahn, Elsi Kaiser, Rick Nouwen, 5 August - 16 August 2002, Trento, Italy.

M.J. Marx, *Hylo@Lics*, 29 July - 29 July 2002, Kopenhagen.

Scientific Awards

M. de Rijke, *Model Checking Algorithms and Tools for Hybrid Logics (HyMoC)*, NWO, July 2002, Dan Haag.

Miscellaneous Scientific Functions or Activities

C.E. Areces, Information Officer of FoLLI, The European Association for Logic, Language and Information; Webmaster of HyLo.net; The Hybrid Logic Webpages.

J. Kamps, Co-organizer Computing with Logic, Language and Information CLLI Seminar.

R.J. Mokken, KP6-Congres: De officiële start van het Zesde Kaderprogramma (KP6) in Nederland, 10 december 2002, World Trade Center, Rotterdam; Project reviews European Commission. MISSION (IST-1999-10655); 5th Framework Program European Union, expert reviews: - 14-16 January 2002, Amsterdam, NL; - 25th - 28th February 2002, Cardiff, Wales, UK; - 21-24 May, Kinsale, Ireland; - 15-18 October, Edinburgh, Scotland, UK.

G.A. Musillo, leader of a reading group in machine learning and computational linguistics.

ILLC Project: Algorithms and Complexity Theory

Principal Researchers

P.W. Adriaans, H.M. Buhrman, S. Druiven, P. van Emde Boas, M.G. de Graaf, T. Lee, M. Sevenster, L. Torenvliet, P.M.B. Vitanyi

Lectures

- P.W. Adriaans, *AI on the Ocean*, Ecai 2002, 23 July 2002, Lyon; *Navigation in the 21th Century*, Hydrographical Society, 1 February 2002, Amsterdam; *An Information Theory Perspective on Structural Variation*, OTS Language Colloquium, 8 March 2002, Utrecht; *Robosail Project*, AI Colloqium Leuven, 25 April 2002, Leuven; *De Geschiedenis van de Kunst in Relatie tot de Geschiedenis van de Wiskunde*, Cyclus Vereniging van Wijsbegeerte 's-Gravenhage, 25 May 2002, 's-Gravenhage.

- H.M. Buhrman, *Quantum Fingerprinting, Complexity of Boolean Functions*, 16 March 2002, Wadern Germany; *Overview of Computer Science, Quantum Fingerprinting*, Pre-RESQ workshop, 2 May 2002, Geneva; *Quantum Computing and Communication Complexity*, Philips Natlab seminar, 5 June 2002, Eindhoven; *The Polynomial Method and Quantum Computing*, Summer School Quantum Computing, 15 July 2002, Montreal; *Combinatorics and Quantum non-locality*, Workshop on Quantum Computing, 21 July 2002, Calgary

- M.G. de Graaf, *The Quantum Yao Principle*, Symposium on Theoretical Aspects of Computer Science, 14 March 2002, Antibes Juan les Pins.

- T. Lee, *Arithmetical Definability on Finite Structures*, Laboratoire d'Algorithmique, Complexite, et Logique, 21 October 2002, Paris; *Arithmetical Definability on Finite Structures*, Fall School in Logic, 22 September 2002, Prague.

- P.M.B. Vitanyi, *The Quantum Computing Challenge*, AI and Cognitive Sciences Symposium, 15 April 2002, Utrecht; *A Protocol for Randomized Anonymous Two-Process Wait-Free Test-and-Set with Finite State Verification*, 9th International Colloquium on Structural Information and Communication Complexity, 10 June 2002, Andros; *Meaningful Information*, Int. Coll. Cognition, Meaning and Complexity Self-Organizing Systems, 14 June 2002, Rome; *Sharpening Occam's Razor*, 8th Annual International Computing and Combinatorics Conference, 15 August 2002, Singapore; *Introduction to Kolmogorov Complexity and Its Applications*, School of information systems colloquium, 29 September 2002, Norwich; *The Similarity Metric*, Learning Machinery Lab, 27 September 2002, Egham, UK; *Quantum Kolmogorov Complexity*, Dagstuhl Seminar 02421, 18 October 2002, Wadern Germany; *Simple Wait-Free Multireader Registers*, International Symposium on Distributed Computing, 28 October 2002; *Kolmogorov's Structure Functions with An Application to the Foundations of Model Selection*, 43th IEEE Symposiumon Foundations of Computer Science, 16 November 2002, Vancouver Canada; *The Similarity Metric*, Universal Learning Algorithms and Optimal Search, 10 December 2002, Vancouver.

Scientific Functions

P.W. Adriaans, *International Colloqium on Grammar Induction*, Member of the Board; *Biomoluculair Informatics Committee*, Member of the Board; *NWO Steering Committee Cognition*, member; *Advisory Board SIKS*, member;

H.M. Buhrman, *IEEE Computational Complexity Theory Conference Series*, Steering Committee member; *Annual Conference on Quantum Information Processing*, Steering Committee Member.

L. Torenvliet, *Dutch Association for Theoretical Computer Science*, Board Member.

P.M.B. Vitanyi, *Scientific Board Encyclopedia of Mathematics*, Member.

Editorships

H.M. Buhrman, *Theory of Computing Systems*, Editor.

P. van Emde Boas, *Information and Computation*, Editor; RAIRO Informatique Theorique, Editor.

P.M.B. Vitanyi, *Journal on Computer and System Sciences*, Guest editor; *International Journal of Foundations of Computer Science*, Editor; *Theory of*

Computing Systems, Editor; *Information Processing Letters*, Editor; *Parallel Processing Letters*, Editor; *Journal of New Generation Computer Systems*, Editor; *Frontiers in Computing Systems Research*, Editor.

Program Committees

P.W. Adriaans, *ICGI 2002*, Chair, 23 September - 25 September 2002, Amsterdam.

H.M. Buhrman, *IEEE Computational Complexity Theory Conference*, Committee member, 1 June - 9 June 2002, Montreal; *Symposium on Theoretical Aspects of Computer Science 2003*, Committee member, 27 February - 1 March 2002, Berlin; *Computational Complexity Conference 2003*, Chair, 7 July - 10 July 2002, Aarhus; *Theoretical Aspects of Computer Science 2002*, Committee member, 14 March - 16 March 2002, Antibes-Juan les Pins.

P. van Emde Boas, *SOFSEM 2004*, Chair Program Committee, 24 January - 29 January 2002, Merin.

P.M.B. Vitanyi, *14th Annual International Symposium on Algorithms and Computation*, Committee member, 15 December - 17 December 2002, Kyoto; *13th European Conference on Machine Learning*, Committee Member, 19 -23 August 2002, Helsinki; *Eight Annual International Computing and Combinatorics Conference*, Committee member, 15 August - 17 August 2002, Singapore; *International Conference on Algorithms Languages and Programming*, Committee member, 8 - 13 July 2002, Malaga.

Scientific Events Organized

P.W. Adriaans, *ICGI 2002*, with H. Fernau, M. van Zaanen, 23 September - 25 September 2002, Amsterdam.

H.M. Buhrman, *Algebraic Methods in Quantum and Classical Models of Computation*, with L. Fortnow, Th. Thierauf, 13 October - 18 October 2002, Wadern, Germany.

S. Druiven, *GLLC7, Seventh Workshop on Games, Logic and Computation*, October - December 2002, Amsterdam.

P. van Emde Boas, *Amsterdam Aachen Exchange*, 15 February 2002, Amsterdam.

P. van Emde Boas, J. Bettin, G. van Emde Boas, C. Cleaveland, K. Czarnecki, *OOPSLA 2002 Workshop 4: Generative Techniques in the context of Model Driven Architecture*, 5 November 2002, Seattle.

Miscellaneous Scientific Functions or Activities

P.W. Adriaans, Chair of Multimedia Committee of the Ministery of Economic Affairs; Vice Chairman of CWI Board; Member HBCN Board.

H.M. Buhrman, Coordinator EU Project Quantum Algorithms and Information Processing (QUAIP), IST-1999-11234/; Co-Coordinator EU Project RESQ IST-2001-37559 (Quantum Computing 2002-2005); Coordinator NWO project Extending Feasible Computation: Quantum Computing.

P. van Emde Boas, Standing Commitee Examinations Computer Science, UvA, chair; Joint committee chairs examination committees Information Sciences, chair.

P.M.B. Vitanyi, Member of the fifth framework project QAIP, IST-1999-11234; Member of the EU project RESQ ST-200137559; Coordinator Project Universal Learning; Coordinator Project Quantum Computing; Coordinator Project Average Case Analysis of Algorithms; Member of the NoE QIPROCONE IST-1999-29064; Member of the ESF QIT Programma; Amsterdam Site Manager of ESPRIT BRA VI NeuroCOLT II Working Group; Member IFIP WG1.2 on Descriptive Complexity and Applications (since 1991); Advisor Monash Key Centre for Computational Data Analysis, Monash University, Australia; Advisor and evaluator for the Japanese Discovery Science Project; Member of the Dutch Robosoccer Committee ‘Autonomous Interacting Multiagent Soccer.’

Appendix 5 Contact information

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Projects
ACT = Algorithms and Complexity Theory
CSIP = Cognitive Systems and Information Processing
CIL = Constructive and Intensional Logic
LIT = Language and Inference Technology
TI = Theory of Interpretation

Worklocations
ND15 = Nieuwe Doelenstraat 15; 1012 CP Amsterdam; fax 020 525 4503
PM24 = Plantage Muidergracht 24; 1018 TV Amsterdam; fax 020 525 5206
CWI = Centrum voor Wiskunde en Informatica; Kruislaan 403; 1098 SJ Amsterdam; fax 020 592 4199
NA166 = Nieuwe Achtergracht 166; 1018 WV Amsterdam; fax 020 525 2800
S134 = Spuistraat 134; 1012 VT Amsterdam; fax 020 525 4429

Appendix 6: Obtaining further information

All information concerning the institute can be obtained from the ILLC Bureau:

ILLC Bureau
Plantage Muidergracht 24
NL-1018 TV Amsterdam
The Netherlands
e-mail: illc@science.uva.nl
phone: +31 20 5256051
fax: +31 20 5255206
www: http://www.illc.uva.nl/

Please contact the bureau if you would like to obtain one of the following (series) of documents:
- ILLC Research Reports and Master theses
- ILLC Dissertations
- ILLC Research plan 2001-2004
- ILLC Brochure Graduate Program in Logic
- ILLC Brochure Logic in Action
- ILLC Annual Report
- Proceedings of scientific events (such as the Amsterdam Colloquia) organized by ILLC
- Other documentation, e.g. concerning visits or scholarships

Information about activities based at or represented by ILLC can be obtained from the following persons or www-addresses:
Folli: Ria Rettob
xrettob@science.uva.nl
http://www.folli.org/

Graduate Program in Logic: Tanja Kassenaar
gpil@science.uva.nl
http://www.illc.uva.nl/gpil

ILLC publications:
Benedikt Löwe (editor), bloewe@science.uva.nl
Marco Vervoort (executive editor), vervoort@science.uva.nl
Marjan Veldhuisen (distribution, orders), illc@science.uva.nl
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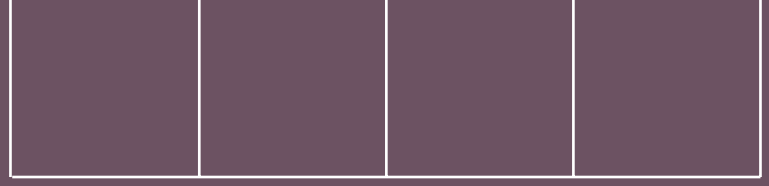

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