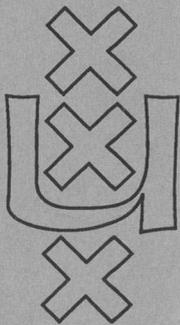




Institute for Logic, Language and Computation

ANNUAL REPORT 1991

ILLC Prepublication Series



University of Amsterdam

The ITLI Prepublication Series

1986 86-01

86-02 Peter van Emde Boas
86-03 Johan van Benthem
86-04 Reinhard Muskens
86-05 Kenneth A. Bowen, Dick de Jongh
86-06 Johan van Benthem

The Institute of Language, Logic and Information
A Semantical Model for Integration and Modularization of Rules
Categorical Grammar and Lambda Calculus
A Relational Formulation of the Theory of Types
Some Complete Logics for Branched Time, Part I Well-founded Time, Forward looking Operators
Logical Syntax

1987 87-01 Jeroen Groenendijk, Martin

87-02 Renate Bartsch
87-03 Jan Willem Klop, Roel de Vrijer
87-04 Johan van Benthem
87-05 Víctor Sánchez Valencia
87-06 Eleonore Oversteegen
87-07 Johan van Benthem
87-08 Renate Bartsch
87-09 Herman Hendriks

Stokhof Type shifting Rules and the Semantics of Interrogatives
Frame Representations and Discourse Representations
Unique Normal Forms for Lambda Calculus with Surjective Pairing
Polyadic quantifiers
Traditional Logicians and de Morgan's Example
Temporal Adverbials in the Two Track Theory of Time
Categorical Grammar and Type Theory
The Construction of Properties under Perspectives
Type Change in Semantics: The Scope of Quantification and Coordination

1988 LP-88-01 Michiel van Lambalgen

LP-88-02 Yde Venema
LP-88-03
LP-88-04 Reinhard Muskens
LP-88-05 Johan van Benthem
LP-88-06 Johan van Benthem
LP-88-07 Renate Bartsch
LP-88-08 Jeroen Groenendijk, Martin Stokhof
LP-88-09 Theo M.V. Janssen
LP-88-10 Anneke Kleppe

Logic, Semantics and Philosophy of Language: Algorithmic Information Theory
Expressiveness and Completeness of an Interval Tense Logic
Year Report 1987
Going partial in Montague Grammar
Logical Constants across Varying Types
Semantic Parallels in Natural Language and Computation
Tenses, Aspects, and their Scopes in Discourse
Context and Information in Dynamic Semantics
A mathematical model for the CAT framework of Eurotra
A Blissymbolics Translation Program

ML-88-01 Jaap van Oosten

ML-88-02 M.D.G. Swaen
ML-88-03 Dick de Jongh, Frank Veltman
ML-88-04 A.S. Troelstra
ML-88-05 A.S. Troelstra

Mathematical Logic and Foundations: Lifschitz' Realizability
The Arithmetical Fragment of Martin Löf's Type Theories with weak Σ -elimination
Provability Logics for Relative Interpretability
On the Early History of Intuitionistic Logic
Remarks on Intuitionism and the Philosophy of Mathematics

CT-88-01 Ming Li, Paul M.B. Vitanyi

CT-88-02 Michiel H.M. Smid
CT-88-03 Michiel H.M. Smid, Mark H. Overmars

Computation and Complexity Theory: Two Decades of Applied Kolmogorov Complexity
General Lower Bounds for the Partitioning of Range Trees
Maintaining Multiple Representations of Dynamic Data Structures

CT-88-04 Dick de Jongh, Lex Hendriks, Gerard R. Renardel de Lavalette

CT-88-05 Peter van Emde Boas
CT-88-06 Michiel H.M. Smid

Computations in Fragments of Intuitionistic Propositional Logic
Machine Models and Simulations (revised version)
A Data Structure for the Union-find Problem having good Single-Operation Complexity
Time, Logic and Computation

CT-88-07 Johan van Benthem

CT-88-08 Michiel H.M. Smid, Mark H. Overmars, Leen Torenvliet, Peter van Emde Boas
CT-88-09 Theo M.V. Janssen

Multiple Representations of Dynamic Data Structures
Towards a Universal Parsing Algorithm for Functional Grammar
Nondeterminism, Fairness and a Fundamental Analogy
Towards implementing RL

CT-88-10 Edith Spaan, Leen Torenvliet, Peter van Emde Boas

CT-88-11 Sieger van Denneheuvel, Peter van Emde Boas
X-88-01 Marc Jumelet

Other prepublications:
On Solovay's Completeness Theorem

1989 LP-89-01 Johan van Benthem

LP-89-02 Jeroen Groenendijk, Martin Stokhof
LP-89-03 Yde Venema
LP-89-04 Johan van Benthem
LP-89-05 Johan van Benthem
LP-89-06 Andreja Priatelj
LP-89-07 Heinrich Wansing
LP-89-08 Víctor Sánchez Valencia
LP-89-09 Zhisheng Huang

Logic, Semantics and Philosophy of Language: The Fine-Structure of Categorical Semantics
Dynamic Predicate Logic, towards a compositional, non-representational semantics of discourse
Two-dimensional Modal Logics for Relation Algebras and Temporal Logic of Intervals
Language in Action
Modal Logic as a Theory of Information
Intensional Lambek Calculi: Theory and Application
The Adequacy Problem for Sequential Propositional Logic
Peirce's Propositional Logic: From Algebra to Graphs
Dependency of Belief in Distributed Systems

ML-89-01 Dick de Jongh, Albert Visser

ML-89-02 Roel de Vrijer
ML-89-03 Dick de Jongh, Franco Montagna
ML-89-04 Dick de Jongh, Marc Jumelet, Franco Montagna
ML-89-05 Rineke Verbrugge
ML-89-06 Michiel van Lambalgen
ML-89-07 Dirk Roorda
ML-89-08 Dirk Roorda
ML-89-09 Alessandra Carbone

Mathematical Logic and Foundations: Explicit Fixed Points for Interpretability Logic
Extending the Lambda Calculus with Surjective Pairing is conservative
Rosser Orderings and Free Variables
On the Proof of Solovay's Theorem
 Σ -completeness and Bounded Arithmetic
The Axiomatization of Randomness
Elementary Inductive Definitions in HA: from Strictly Positive towards Monotone
Investigations into Classical Linear Logic
Provable Fixed points in $IA_0 + \Omega_1$

CT-89-01 Michiel H.M. Smid

CT-89-02 Peter van Emde Boas
CT-89-03 Ming Li, Herman Neuféglise, Leen Torenvliet, Peter van Emde Boas

Computation and Complexity Theory: Dynamic Deferred Data Structures
Machine Models and Simulations
On Space Efficient Simulations

CT-89-04 Harry Buhrman, Leen Torenvliet

CT-89-05 Pieter H. Hartel, Michiel H.M. Smid, Leen Torenvliet, Willem G. Vree
CT-89-06 H.W. Lenstra, Jr.
CT-89-07 Ming Li, Paul M.B. Vitanyi

A Comparison of Reductions on Nondeterministic Space
A Parallel Functional Implementation of Range Queries
Finding Isomorphisms between Finite Fields
A Theory of Learning Simple Concepts under Simple Distributions and Average Case Complexity for the Universal Distribution (Prel. Version)

CT-89-08 Harry Buhrman, Steven Homer, Leen Torenvliet

CT-89-09 Harry Buhrman, Edith Spaan, Leen Torenvliet
CT-89-10 Sieger van Denneheuvel

Honest Reductions, Completeness and Nondeterministic Complexity Classes
On Adaptive Resource Bounded Computations
The Rule Language RL/1
Towards Functional Classification of Recursive Query Processing

CT-89-11 Zhisheng Huang, Sieger van Denneheuvel, Peter van Emde Boas

X-89-01 Marianne Kalsbeek
X-89-02 G. Wagemakers
X-89-03 A.S. Troelstra

Other Prepublications: An Orey Sentence for Predicative Arithmetic
New Foundations: a Survey of Quine's Set Theory
Index of the Heyting Nachlass
Dynamic Montague Grammar, a first sketch
The Modal Theory of Inequality

X-89-04 Jeroen Groenendijk, Martin Stokhof

X-89-05 Maarten de Rijke
X-89-06 Peter van Emde Boas

Een Relationele Semantiek voor Conceptueel Modelleren: Het RL-project

1990 *Logic, Semantics and Philosophy of Language*

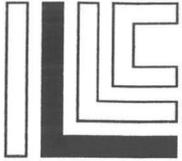
LP-90-01 Jaap van der Does
LP-90-02 Jeroen Groenendijk, Martin Stokhof
LP-90-03 Renate Bartsch
LP-90-04 Aarne Ranta
LP-90-05 Patrick Blackburn
LP-90-06 Gennaro Chierchia
LP-90-07 Gennaro Chierchia
LP-90-08 Herman Hendriks
LP-90-09 Paul Dekker
LP-90-10 Theo M.V. Janssen
LP-90-11 Johan van Benthem
LP-90-12 Serge Lapierre
LP-90-13 Zhisheng Huang
LP-90-14 Jeroen Groenendijk, Martin Stokhof
LP-90-15 Maarten de Rijke
LP-90-16 Zhisheng Huang, Karen Kwast
LP-90-17 Paul Dekker

A Generalized Quantifier Logic for Naked Infinitives
Dynamic Montague Grammar
Concept Formation and Concept Composition
Intuitionistic Categorical Grammar
Nominal Tense Logic
The Variability of Impersonal Subjects
Anaphora and Dynamic Logic
Flexible Montague Grammar
The Scope of Negation in Discourse, towards a flexible dynamic Montague grammar
Models for Discourse Markers
General Dynamics
A Functional Partial Semantics for Intensional Logic
Logics for Belief Dependence
Two Theories of Dynamic Semantics
The Modal Logic of Inequality
Awareness, Negation and Logical Omniscience
Existential Disclosure, Implicit Arguments in Dynamic Semantics

ML-90-01 Harold Schellinx

ML-90-02 Jaap van Oosten
ML-90-03 Yde Venema
ML-90-04 Maarten de Rijke
ML-90-05 Domenico Zambella
ML-90-06 Jaap van Oosten

Mathematical Logic and Foundations: Isomorphisms and Non-Isomorphisms of Graph Models
A Semantical Proof of De Jongh's Theorem
Relational Games
Unary Interpretability Logic
Sequences with Simple Initial Segments
Extension of Lifschitz' Realizability to Higher Order Arithmetic, and a Solution to a Problem of F. Richman



Institute for Logic, Language and Computation

Plantage Muidergracht 24

1018TV Amsterdam

Telephone 020-525.6051, Fax: 020-525.5101

ANNUAL REPORT 1991

1 The Institute for Logic, Language and Computation ILLC

ILLC started its life in 1986 as 'ITLI': the Institute for Language, Logic and Information (the acronym representing the Dutch name: 'Instituut voor Taal, Logica en Informatie'), an association of permanent staff members of the University of Amsterdam, based on the three departments of Mathematics, Computer Science and Philosophy. In 1989, computational linguists joined in from the Faculty of Humanities, and in 1991, the computational component of the group was strengthened by a further cooperation with the local programming research group, while changing its name to ILLC. In the same year, recognition was obtained from the University Council as an official research institute of the University of Amsterdam.

Participating Groups

Department of Mathematics and Computer Science

Mathematical Logic & Theoretical Informatics

Programming Research

Department of Philosophy

Philosophy of Language & Philosophical Logic

Faculty of Humanities

Computational Linguistics

Scientific Board

Renate Bartsch (chairperson, chair of Philosophy of Language)

Johan van Benthem (chair of Mathematical Logic)

Jan Bergstra (chair of Programming & Software Engineering)

Remco Scha (chair of Computational Linguistics)

Anne Troelstra (chair of Foundations of Mathematics)

Scientific Director

Johan van Benthem, ILLC / FWI, University of Amsterdam,

Plantage Muidergracht 24,

1018 TV AMSTERDAM, The Netherlands,

phone (+31) (0)20 525 5807

fax (+31) (0)20 525 5101

email johan@fwi.uva.nl

ILLC Bureau

Kattie Schoot
email kattie@fwi.uva.nl

ILLC Permanent Staff

Department of Mathematics and Computer Science

Krzysztof Apt (chair of Foundations of Artificial Intelligence)
Johan van Benthem (chair of Mathematical Logic)
Jan Bergstra (chair of Programming & Software Engineering)
Rein Brunekreef
Kees Doets
Peter van Emde Boas (chair of Theoretical Computer Science)
Theo Janssen
Dick de Jongh
Paul Klint (chair of Programming Environments)
Sjouke Mauw
Piet Rodenburg
Leen Torenvliet
Anne Troelstra (chair of Foundations of Mathematics)
Paul Vitányi (chair of Theoretical Computer Science)

Department of Philosophy

Renate Bartsch (chair of Philosophy of Language)
Jeroen Groenendijk
Martin Stokhof
Frank Veltman
Roel de Vrijer

Department of Computational Linguistics

Remco Scha (chair of Computational Linguistics)
Henk Zeevat

In addition to its permanent staff, ILLC has some 4 temporary staff members, 4 post-doctoral fellows and 25 research assistants.

2 Research Program

General Organisation

ILLC research is divided into three broad clusters: Logic and Informatics, Logic and Linguistics, Logic and Mathematics, arranged in the following subprograms:

- Logic and Foundations of Mathematics
- Logic and Semantics
- Computation and Complexity
- Theory of Interpretation
- Programming Research
- Computational Linguistics

Research in the first area continues a long-standing Dutch tradition in constructive mathematics, especially intuitionism, but other approaches are represented too: model theory, set theory, proof theory and lambda calculus (Troelstra, Doets, De Jongh).

The second area connects the study of formal, natural and programming languages. Main themes include intensional logic, categorial grammar, dynamic logic, information-based semantics, compositionality and partiality (Van Benthem, Van Emde Boas, Janssen).

The third area is concerned with structural complexity theory, machine models, descriptive complexity, dynamic data structures, complexity of logical systems and algorithmic aspects of data bases (Van Emde Boas, Vitányi, Torenvliet).

The fourth area centers around meaning and discourse, and its philosophical foundations. Its goal is the design of one comprehensive formal theory of interpretation, integrating Montague Grammar with discourse representation theory. Key topics are the dynamics of interpretation, partial information and flexibility in syntax and semantics (Bartsch, Groenendijk, Stokhof, Veltman, De Vrijer, Zeevat).

The fifth area is that of programming research, whose main themes are formal methods in programming (process algebra and algebraic specifications) and generative techniques in the design of programming environments (Bergstra, Rodenburg, Klint).

The sixth area, computational linguistics, is concerned with the construction of implemented models of natural languages including their meaning and use. Key topics are the integration of pragmatological

phenomena into natural language processing, explicit formalisms for text and dialogue, statistical approaches to parsing and the further development of the unification grammar paradigm (Bartsch, Scha).

These research lines often interact, resulting in joint work on such topics as epistemic semantics and pragmatics, categorial grammar and type theory, dynamic reasoning and default logic, modal logic and process algebra, and semantics of programming languages.

Some More Detailed Research Topics

Logic and Foundations of Mathematics

- realizability and Martin-Löf type theories
- proof theory, lambda calculus, type theory and linear logic
- bounded arithmetic, provability and interpretability logic

Logic and Semantics

- generalized quantifiers and general type structure
- categorial grammar and lambda calculus
- logic of information, dynamic logic and relational algebra
- enriched formalisms for modal logic, including epistemic and temporal logic
- default reasoning in conditional logic

Computation and Complexity

- dynamic and intensional phenomena in semantics of programming
- minimal-model semantics of logic programming
- mathematical complexity theory, both theoretical and applied
- theory of databases, including query languages and knowledge representation
- theoretical foundations of machine translation

Theory of Interpretation

- description of quantifiers and determiners, modal and epistemic expressions, conditional sentences, comparatives and temporal expressions
- semantics and pragmatics of questions and answers

- syntactic power of flexible Montague Grammar and related categorial paradigms
- mechanism of interpretation, compositionality and universal semantic constraints
- integration of lexical semantics into sentence and text semantics and pragmatics.

Programming Research

- Formal Models: process algebra, algebraic specifications, module algebra
- Programming Environments: generation of interactive scanners, parsers and type checkers, executable algebraic specifications

Computational Linguistics

- data-oriented parsing
- discourse grammar, discourse representation and dynamic update semantics
- sign-based formalisms
- unification

3 Further Scientific Activities

Prepublication Series

ILLC has one central pre-publication series, divided into four headings:

Computation and Complexity Theory (code CT)

Logic, Semantics and Philosophy of Language (code LP)

Mathematical Logic and Foundations (code ML)

Computational Linguistics (code CL)

Some less official prepublications are given code X.

So far, 175 titles have appeared altogether. Coordinating editor of the series is Dick de Jongh. Copies may be obtained from the ILLC Bureau.

In addition, the Programming Research Group has a Report Series in which 83 titles have appeared so far. Its current coordinating editor is Gert Veltink.

Colloquia

ILLC organizes several regular colloquia for staff members, Ph. D. students and advanced students, which also serve a broader community outside of Amsterdam:

- Logic Colloquium
- Modal Logic Meetings
- Montague Colloquium
- Programming Seminar
- Semantic Parallels

In addition, there are scientific ad-hoc events such as the 'Amsterdam-London Exchange' or the 'Amsterdam-Münster contacts'.

Conferences

ILLC organizes regular workshops and conferences. Its major tradition so far is the biannual 'Amsterdam Colloquium' which started in 1976, and which has become a major international forum for researchers in the logical semantics of natural language (broadly conceived). ILLC is also trying to establish similar traditions in the fields of 'Logic and Computation' and 'Logic and Mathematics'.

GRASS Publication Series

ILLC is a partner in the GRASS publication series, published by De Gruyter (Berlin) with colleagues from Bloomington, Groningen and Utrecht. Its managing editors are Alice ter Meulen (University of Indiana) and Martin Stokhof (University of Amsterdam). The editorial board consists of Renate Bartsch, Johan van Benthem, Henk Verkuyl (Utrecht), Co Vet (Groningen).

Titles which appeared in the past two years:

- Michael Moortgat, *Categorical Investigations. Logical and Linguistic Aspects of the Lambek Calculus*
- Irena Bellert, *Feature System for Quantificational Structures in Natural Language*
- Renate Bartsch, Peter van Emde Boas & Johan van Benthem (eds.), *Semantics and Contextual Expression*
- D. Zaefferer, ed., *Semantic Universals and Universal Semantics*

Editorships and Memberships Editorial Boards

- Krzysztof Apt:
editor Science of Computer Programming; RAIRO, Theoretical Informatics; Information and Computation; Journal of Logic and Computation; Wiley/Teubner Series in Computer Science; Fundamenta Informaticae

- Renate Bartsch:
editorial board Journal of Semantics and Theoretical Linguistics

- Johan van Benthem:
coordinating editor Journal of Symbolic Logic
associate editor Linguistics and Philosophy; Logic and Computation; Journal of Logic, Language and Information

- Peter van Emde Boas:
editor Information and Computation; Journal of Algorithms; RAIRO Informatique Theorique et Applications

- Jeroen Groenendijk:
associate editor Linguistics and Philosophy
editorial board Natural Language Semantics

- Martin Stokhof:
associate editor Linguistics and Philosophy
editor GRASS-series
editorial board Natural Language Semantics

- Anne Troelstra:
managing editor Journal of Symbolic Logic
editor Studies in Logic and the Foundations of Mathematics

- Paul Vitányi:
editorial board Distributed Computing; Parallel Processing Letters; Mathematical Systems Theory / Computer Systems Theory; Frontiers in Computing Systems Research; New Generation Computer Systems

4 Undergraduate Teaching

The following selection from courses taught by ILLC staff gives an indication of the training which students in the field are supposed to acquire. These courses function within broader curricula for Artificial Intelligence, Computational Linguistics, Computer Science as well as Mathematics in the various departments spanned by the institute.

Philosophy

- philosophy of language
- philosophical logic
- logic, language and meaning
- intensional logic

Mathematics

- sets and models
- lambda calculus and type theory
- logical structures in natural language
- recursion theory
- intuitionism and proof theory
- linear logic

Computer Science

- formal languages and automata
- semantics of programming
- process algebra
- complexity theory
- formal methods in artificial intelligence
- algebraic specifications, term rewriting

In addition, each year various advanced courses and colloquia are organized on selected topics. In 1991 these included

- foundations of logic programming
- theory of automatic translation
- non-standard logics in artificial intelligence
- intentionality
- formal arithmetic
- dynamic logic of information flow

5 Post-Graduate Training

ILLC coordinates the national postgraduate Network for Logic, Language and Information (TLI), which is funded by the Dutch Ministry of Education. This network is a national cooperation in mathematical logic, philosophical logic, linguistics, philosophy of language and computer science. TLI organizes postgraduate training in this interdisciplinary field on a national scale, and finances ten four-year post-graduate scholarships, in addition to available local resources. ILLC's partners are the following groups:

University of Groningen

Faculty of Humanities (Zwarts, Vet, De Mey)

Faculty of Mathematics and Natural Sciences (Renardel de Lavalette, Terlouw)

Department of Philosophy (Kuipers)

University of Utrecht

Faculty of Humanities (Moortgat, Verkuyl)

Department of Philosophy (Van Dalen, Bezem, Visser)

Department of Mathematics (Van Leeuwen, Moerdijk)

University of Nijmegen

Department of Philosophy (Seuren, Van der Sandt)

Department of Mathematics and Computer Science (Barendregt, Veldman)

University of Tilburg

Faculty of Humanities (Bunt, Muskens)

TLI encourages coordination of courses at various sites, oversees common standards for Ph. D. supervision, and maintains a national system of research colloquia in which each student can find at least one appropriate niche.

Current national colloquia include:

- Type Theory
- Partial and Dynamic Semantics
- Non-Monotonic Reasoning.

Moreover, TLI publishes a Newsletter containing information about its activities as well as other relevant information for its participants and colleagues in the field at large.

Coordinator:

Jacques van Leeuwen

Department of Mathematics and Computer Science

University of Amsterdam

Plantage Muidergracht 24

1018 TV AMSTERDAM

phone (+31) (0)20 524 6090

email jacques@fwi.uva.nl

6 Scientific Collaboration

National Activities

Inside Amsterdam itself, through various joint appointments, ILLC serves as a link between its sponsoring departments, while there are also official ties with the Centre for Mathematics and Computer Science (CWI), especially in the fields of Logic Programming (Apt), Complexity Theory (Vitányi), Programming Research (Klint) and Computational Linguistics (Van Eijck).

On a national level, ILLC participates in several large-scale research projects with other universities, such as 'Semantic Parallels in Natural Language and Computation' (with Utrecht and CWI), 'Type Theories' (with Utrecht and Nijmegen). Moreover, several national research colloquia are functioning, some of them of several decades' standing, such as the bi-weekly "Montague Colloquium" providing a forum for the Dutch semanticists, as well as the "Intercity Colloquium" which serves the national community in the field of mathematical logic and the philosophy of mathematics.

In 1991, an official proposal has been made for turning the TLI Network into a National Graduate School and Research Institute in Pure and Applied Logic formalizing this traditional system of cooperation. This proposal is currently being considered for implementation by the Royal Dutch Academy of Sciences.

International Activities

ESPRIT Projects and Networks

ILLC is the coordinating site in the Esprit Basic Research Action 'Dynamic Interpretation of Natural Language' (DYANA), which has functioned since 1989. In this project, ILLC cooperates with the Centre for Cognitive Science of the University of Edinburgh, the Seminar für Natürlich-Sprachliche Systeme of the University of Tübingen, the Zentrum für Informationsforschung at the University of München and the Institut für Maschinelle Sprach-verarbeitung at the University of Stuttgart. Likewise, ILLC is a major node in the Basic Research Action on 'Computational Logic' (COMPULOG), together with institutes in Scandinavia, Portugal, Great Britain, Germany, France and Italy. Finally, ILLC is a partner in several mainstream Esprit projects, such as CONCUR.

ILLC also participates in two newly organised European 'Esprit Networks of Excellence' in its field, being 'Language and Speech' as well as 'Computational Logic'.

ERASMUS and TEMPUS Exchanges

ILLC participates in the 'European Post-Graduate Network for the Study of Language, Logic and Information'. This program has been funded by the Commission of the European Communities within the framework of the Erasmus Program since 1990. Universities from the following cities are partners: Groningen, Leuven, Aarhus, Tübingen, Madrid, Toulouse, Dublin, Amsterdam, London and Edinburgh. The cooperation involves a mutual exchange program that enables students to continue and complete their studies at another host university.

In 1991, ILLC together with the University of Groningen successfully applied for a project in the TEMPUS programme. This is a new venture of the Commission of the European Communities for cooperation with Eastern Europe. The project, coordinated by ILLC and Groningen, is an extension of the above Erasmus project. Its participants are various universities in Western Europe as well as the following universities in Eastern Europe: Adam Mickiewicz University (Poznan), University of Belgrade, Bulgarian Academy of Sciences (Sofia), Charles University (Prague), Eötvös Lorand University (Budapest), Hungarian Academy of Sciences (Budapest), Jagiellonian University (Cracow), Kliment Ohridski University (Sofia), Serbian Academy of Sciences (Belgrade), University of Warsaw, University of Wrocław.

On a more ad-hoc basis, ILLC maintains regular contacts with such centers of research as the Center for the Study of Language and Information (Stanford University), the Department of Linguistics at Amherst (University of Massachusetts), the Cognitive Science Center at Austin (University of Texas), the Department of Modern Languages and Linguistics at Ithaca (Cornell University), the Department of Mathematics at Siena (University of Siena), the Steklov Institute (Moscow), the Department of Mathematics at Oslo (COSMOS, University of Oslo). In particular, ILLC participates in an exchange agreement with the Steklov Institute of Mathematics in Moscow (coordinators: Dick de Jongh and Sergei Artemov), involving staff exchanges as well as material assistance.

European Foundation for Logic, Language and Information

In 1990, a number of researchers in the interdisciplinary field spanning logic, linguistics and computer science have taken the initiative to create a more visible international basis for their cooperations. The result was the European Foundation for Logic, Language and Information (FoLLI). The main scientific interest in our community revolves around the study of language, cognition and computation, with the use of logical techniques (broadly conceived) as a red thread unifying research efforts across various disciplines. Specific topics exemplifying this interest are the semantics of natural, formal and programming languages, or the varieties of human and mechanical inference. FoLLI serves here as a forum for

communication, encouraging increases in 'topological connectivity' of the field and acting as a platform for contacts with outside organisations in business and government.

Current FoLLI activities include:

- Organisation of an annual Summer School in Logic, Language, and Information
- Organisation of regular conferences in the field
- Sponsoring a new Journal of Logic, Language and Information (JoLLI)
- Sponsoring a Book Series Studies in Logic, Language and Information (SiLLI)
- Publishing a newsletter for the field
- Acting as a Clearing House for scientific information
- managing exchange programs both in western and eastern Europe (ERASMUS, TEMPUS)

ILLC serves as the coordinating Bureau for FoLLI.

E-mail: folli@fwi.uva.nl

European Summer School in Logic, Language and Information

As part of FoLLI's activities, ILLC is involved in the organisation of the European Summer Schools in Language, Logic and Information, whose third instalment was held in Saarbrücken, August 12 - 23, 1991. The main focus of these summer schools is the interface between linguistics, logic and computation where it concerns the modelling of human linguistic and cognitive ability.

The 1991 courses were divided into four areas:

- computational linguistics
- linguistics and cognition
- logic and computation
- semantics

They covered a variety of topics from fields of study such as theoretical and computational linguistics, logic and philosophy of language. The school contained three closely related but distinct components. First, there was a fully integrated program of taught courses, at both introductory and advanced levels. Introductory courses were designed to familiarise students with new fields and did not presuppose any background

knowledge, while advanced courses were designed to allow students, staff and researchers to acquire more specialised expertise in areas they are already familiar with. Second, there was a series of workshops which provided a forum for in-depth discussion of topics at the forefront of current research. And third, there was a series of invited lectures by well-known experts in the field.

The Summer School was visited by 671 people from 31 countries. The fourth instalment will be held at the University of Essex, Colchester, UK, August 17-28. The organisation will again take place under auspices of FoLLI. ILLC and the Dutch Network TLI will participate. Dutch Ph. D. students are encouraged to visit these events to become part of an international community in the field.

7 Report on Activities in 1991

7.1 Publications of Staff Members

Aarts, E., *Recognition for acyclic context-sensitive grammars is NP-complete.* in: J. van Leeuwen (ed.), Proc. CSN'91, CWI Amsterdam, p. 7-16.

Adriaans, P., *Algoritmen voor het effectief leren van categoriale en contextvrije talen.* in: Proc AIT'91, St. Informatica congressen, p. 81-89.

Apt, K. & Bezem, M., *Acyclic programs.* in: New Generation Computing 9, 3+4, p.335-363.

Apt, K. & Olderog, E.-R., *Introduction to program verification.* IFIP State-of-the-art Reports: Formal Description of Programming Concepts (Neuhold, E. & Paul, M., eds.), Springer-Verlag, p.363-430.

Apt, K. & Olderog, E.-R., *Verification of Sequential Programs. Texts and monographs in Computer Science,* Springer-Verlag, 441+xvi pages.

Apt, K. & Olderog, E.-R.: *Using Transformations to verify parallel programs. Algebraic Methods II: Theory, Tools and Applications.* Lecture Notes in Computer Science 490, p.55-81.

Apt, K. & Pedreschi, D., *Proving Termination of General Prolog Programs.* Proc. International Conference on Theoretical Aspects of Computer Software. Lecture Notes in Computer Science 526, p.265-289.

Apt, K. Albadi, M., Alpern, B., Francez, N., Katz, S., Lamport, L. & Schneider, F.B., *Preserving liveness: comments on "Safety and Liveness*

- from a Methodological Point of View*. Information Processing Letters 40, p.141-142.
- Apt, K., Bol, R & Klop, J.W.: *An analysis of loop checking mechanisms for logic programs*. Theoretical Computer Science 86, 35-79.
- Baeten, J.C.M, J.A. Bergstra, *Recursive Process Definitions with the State Operator*, TCS 82, p. 285-302.
- Baeten, J.C.M., J.A. Bergstra, *Asynchronous Communication in Real Space Process Algebra*. In: J. Vytopil (ed.), *Formal Techniques in Real-time and Fault-tolerant Systems*, Springer Lecture Notes in Computer Science 571, p. 473-492.
- Baeten, J.C.M., J.A. Bergstra, *Design of a Specification Language by Abstract Syntax Engineering*. In: J.A. Bergstra, L.M.G. Feijs (eds.), Springer Lecture Notes in Computer Science 490, p. 363-394.
- Baeten, J.C.M., J.A. Bergstra, G.J. Veltink, *A Process Specification Formalism Based on Static COLD*. In: J.A. Bergstra, L.M.G. Feijs (eds.), *Algebraic Methods II: Theory, Tools and Applications*, Springer Lecture Notes in Computer Science 490, p. 303-335.
- Baeten, J.C.M., J.A. Bergstra, *Real Space Process Algebra*. In: J.C.M. Baeten, J.F. Groote (eds.), *Proceedings of CONCUR'91*, Springer Lecture Notes in Computer Science 527, p. 376-392.
- Baeten, J.C.M., J.A. Bergstra, *Real Time Process Algebra*. Formal Aspects of Computing 3, p. 142-188.
- Bartsch, R.I., *Concept Formation and Concept Composition*. In: F. Bradley (ed.); *Wordmeaning and Concepts*, DYANA ESPRIT Basic Research Action, B 3175, Deliverable R2.4, DYANA Administrator, Centre for Cognitive Science, University of Edinburgh, Edinburgh, p. 1-55.
- Benthem, J. van, *Beyond Accessibility: New Semantics for Modal Predicate Logic*, in M. de Rijke, ed., *Colloquium on Modal Logic*, Dutch Network of Language, Logic and Information, 1-14.
- Benthem, J. van, Editorial, *Journal of Logic and Computation* 1:3, p. 1-4.
- Benthem, J. van, *Generalized Quantifiers and Generalized Inference*, in J. van der Does & J. van Eijck, eds., *Quantification in the Netherlands*, Proceedings ' // Project', Center for Mathematics & Computer Science, Amsterdam.
- Benthem, J. van, H. van Ditmarsch, J. Ketting, W. Meyer Viol, *Logica voor Informatici*, leerboek, Addison-Wesly, Amsterdam.
- Benthem, J. van, *Language in Action*, Journal of Philosophical Logic 20, p. 1-39.

- Benthem, J. van, *Language in Action: Categories, Lambdas and Dynamic Logic*, monograph, North-Holland, Amsterdam, (Studies in Logic, vol. 130).
- Benthem, J. van, *Linguistic Universals in Logical Semantics*, in D. Zaefferer, ed., *Semantic Universals and Universal Semantics*, Foris, Berlin, (GRASS series), p. 17-36.
- Benthem, J. van, *Natural Language: from Knowledge to Cognition*, in E. Klein & F. Veltman (eds.), *Natural Language and Speech*, Proceedings ESPRIT Symposium, Brussels November 1991, Springer Verlag, Berlin, p. 159-171.
- Benthem, J. van, *Quantifiers in the World of Types*, in J. van der Does & J. van Eyck, eds., *Quantification in the Netherlands*, Proceedings // Project, Center for Mathematics & Computer Science, Amsterdam.
- Benthem, J. van, *The Logic of Time*, monograph, Reidel, Dordrecht, (Synthese Library, vol. 156), [second revised and expanded edition].
- Berg M.H. van den, *Dynamic Generalized Quantifiers*. In: *Generalized Quantifier Theory and Applications*. (J.M. van der Does & J. van Eijck, eds), p. 223-244. Publ.: Dutch Network for Language, Logic and Information.
- Berg, M.H. van den & H. Prüst, *Common Denominators and Default Unification*. In: *Computer Linguistics in the Netherlands - Papers from the First CLIN-meeting*. (T.v.d. Wouden ed.), p.1-1. Publ.: OTS, Utrecht.
- Bergstra, J.A., *Filosofische aspecten van digitale systemen*. Diëtrede Rijksuniversiteit Utrecht, 13 p.
- Bergstra, J.A., L.M.G. Feijs (eds.), *Algebraic Methods II: Theory, Tools and Applications*, Springer Lecture Notes in Computer Science 490.
- Bergstra, J.A., S. Mauw, F. Wiedijk, *Uniform Algebraic Specifications of Finite Sorts with Equality*. *Int. J. of Foundations of Computer Science* 2, 1, p. 43-65.
- Buhrman, H. & S Homer, *Superpolynomial circuits, almost sparse oracles and the exponential hierarchy*. Report Boston University TR #91-005.
- Buhrman, H., E. Spaan & L. Torenvliet, *Bounded Reductions*. in: *Proc. 8th STACS conference*, Springer LNCS 480, p. 410--421.
- Buhrman, H., S. Homer & L. Torenvliet, *Completeness for nondeterministic complexity classes*, in: *Mathematical Systems Theory* 24, p. 179--200.
- Chierchia, G., *Anaphora and Dynamic Logic*. In: M.J.B. Stokhof, J.A.G. Groenendijk (eds.), *Quantification and Anaphora I*. Dyana Deliverable R.

- 2.2.A (revised version), pp. 37-78. Publ.: Centre for Cognitive Science, University of Edinburgh.
- Dekker, P.J.E., *The Scope of Negotiation in Discourse*. In: M.J.B. Stokhof, F. Veltman (eds.), *Quantification and Anaphora*. DYANA EBRA BR 3175, p. 79-134. Publ.: Centre for Cognitive Science, University of Edinburgh.
- Denneheuvel, S. van & K.L. Kwast, *Intensional Objects in RL/1*. in: Proc. of the Int. Conf. on Management of Data (COMAD'91), Bombay, India, p. 219-232.
- Denneheuvel, S. van & K.L. Kwast, *Weak equivalence for constraint sets*. in: Proc. of the Int. Joint Conferences on Artificial Intelligence (IJCAI'91), August, Sydney, p. 851-856.
- Denneheuvel, S. van, *Constraint solving on database systems; design and implementation of the rule language RL/1*, Dissertation UvA.
- Denneheuvel, S. van, K.L. Kwast, G.R. Renardel de Lavalette & E. Spaan, *Query optimization using rewrite rules*. in: R. V. Book (ed.), *Proc. 4th Int. Conf. on Rewriting Techniques and Applications (RTA'91)*, Springer Lecture Notes in Computer Science 488, Como (Italy), p. 252-263.
- Denneheuvel, S. van, K.L. Kwast, P. van Emde Boas, F. de Geus & E. Rotterdam, *Symbolic computation in RL*. in: D. Karagiannis (ed.), *DEXA'91, Proc. Database and Expert System Applications*, Springer Verlag, Wien, New York, p. 559-564.
- Denneheuvel, S. van, Zhisheng Huang., K.L. Kwast & G.R. Renardel de Lavalette, *A normal form for PCSJ expressions*, Journal of Zhenjiang Shipbuilding University, China, vol 2, p. 67-86.
- Does, J.M. v.d. (ed.), *Quantification and Anaphora*. Report to: Esprit Basic Research Action 3175, DYANA. Centre for Cognitive Science, Edinburgh, pp. 73.
- Does, J.M. v.d., *A Generalized Quantifier Logic for Naked Infinitives*. Linguistics and Philosophy, 14, p. 241-294.
- Does, J.M. v.d., *Among Collections*. In: J.M. v.d. Does (ed.), *Quantification and Anaphora II*. Esprit Basic Research Action 3175, DYANA. Centre for Cognitive Science, University of Edinburgh, p. 1-35.
- Does, J.M. v.d., J. van Eijck (eds.), *Generalized Quantifier Theory and Application*. Dutch Network for Language, Logic and Information, Amsterdam, pp. 450.
- Does, J.M. v.d. & Verkuyll, H.J., *The semantics of Plural Noun Phrases*. in: Van der Does & Van Eijck (eds.), *Generalized Quantifier Theory and Applications*. TLI-netwerk publicatie.

- Does, J.M. v.d., *Applied Quantifier Logics*. Dissertation UvA.
- Drost, N.J., *Algebraic Formulations of Trace Theory*. In: J.C.M. Baeten, J.F. Groote (eds.); *Proceedings of CONCUR'91*, Springer Lecture Notes in Computer Science 527, p. 157-171.
- Emde Boas, P. van, *Er ligt hier een taak voor de wapenindustrie: pleidooi voor een eromtica-project in Amsterdam*. *Folia Civitatis* 44, nr.41, 16-16.
- Emde Boas, P. van, Geus, F. de, Rotterdam, E. & Denneheuvél, S. van, *Physiological Modelling Using RL*. in: M. Stefanelli, A. Hasman, M. Fieschi & J. Talmon (eds.), *AIME'91, Proc. Third conference on artificial intelligence in Medicine*. Springer Lecture Notes in Medical Informatics 44, p.198-210.
- Emde Boas, P. van, Geus, F. de, Rotterdam, E. , Kwast, K. & Denneheuvél, S. van, *Symbolic Computation in RL*. in: D. Karagiannis (ed.), *DEXA '91, Proc. Database and Expert System Applications*. Springer Verlag, Wien/New York, p.559-564.
- Gamut, L.T.F. (=J.F.A.K. van Benthem, ; J.A.G. Groenendijk, D.H.J. de Jongh, M.J.B. Stokhof, H.J. Verkuyl); *Logic, Language and Meaning, Vol. One: Introduction to Logic*. Univ. of Chicago Press, Chicago Illin., pp. 282 + xvi.
- Gamut, L.T.F. (= Benthem, J.F.A.K, van; J.A.G. Groenendijk, D.H.J. de Jongh, M.J.B. Stokhof, H.J. Verkuyl); *Logic, Language and Meaning, Vol. Two: Intensional Logic and Logical Grammar*. Univ. of Chicago Press, Chicago Illin., pp. 349 + xiv.
- Geus, F. de, E. Rotterdam, S. van Denneheuvél & P. van Emde Boas, *Physiological Modelling using RL*. in: M. Stefanelli, A. Hasman, M. Fieschi & J. Talmon (eds.), *AIME'91, Proceedings third conference on artificial intelligence in Medicine*, Springer Lecture Notes in Medical Informatics 44, p. 198-210.
- Groenendijk, J.A.G. & D. Beaver, *Introduction to Dyana Deliverable 2.2.A*. In: Groenendijk, J.A.G., M.J.B. Stokhof & D. Beaver (eds), *Quantification and Anaphora I*. Dyana Deliverable R. 2.2.A. (revised version), pp. v-viii. Publ.: Centre for Cognitive Science, University of Edinburgh.
- Groenendijk, J.A.G. & M.J.B. Stokhof, *Dynamic Montague Grammar*. In: *Quantification and Anaphora I*. Dyana Deliverable R. 2.2.A (revised version). (Groenendijk, J.A.G., M.J.B. Stokhof & D. Beaver eds), pp. 1-35. Publ.: Centre for Cognitive Science, University of Edinburgh.
- Groenendijk, J.A.G. & M.J.B. Stokhof, *Dynamic Predicate Logic*. In: *Linguistics and Philosophy*, Jg. 14, nr. 1, p. 39-100.

- Groenendijk, J.A.G. & M.J.B. Stokhof, *Two theories of dynamic semantics*. In: J. van Eijck (ed.), *Logics in AI*, p. 55-64. Publ.: Springer Verlag, Berlin.
- Groeneveld, W., *Situatiesemantiek*. *Wijsgerig Perspectief of Maatschappij en Wetenschap*, 32, 2, p. 47-53.
- Groote, J.F., *Process Algebra and Structured Operational Semantics*. Dissertation Centrum voor Wiskunde en Informatica.
- Hendriks, H.L.W., *Compositionality and Contextuality*, 'Dynamic Interpretation of Natural Language'. Report R1.2.E, Esprit Basic Research Action 3175, DYANA. Centre for Cognitive Science, University of Edinburgh, pp.23.
- Hoek, W. v.d. & M. de Rijke, *Generalized quantifiers and modal logic*. in: M. de Rijke (ed.), *Colloquium on modal logic 1991*, Dutch network for language, logic and information, p. 105-128
- Jongh, D.H.J. de, A. Visser, *Explicit Fixed Points in Interpretability Logic*. In: *Studia Logica*, 50, p.39-50.
- Jongh, D.H.J. de, F. Montagna, *Rosser orderings and Free Variables*. In: *Studia Logica* 50, p. 71-80.
- Jongh, D.H.J. de, L. Hendriks, G. Renardel de Lavalette, *Computations in Fragments of Intuitionistic Propositional Logic*. In: *Journal of Automated Reasoning*, 7, p. 537-561.
- Jongh, D.H.J. de, M. Jumelet, F. Montagna, *On the proof of Solovay's Theorem*. In: *Studia Logica* 50, p. 51-70.
- Kasper, W., M. Moens & H.W. Zeevat, *Anaphora Resolution in ACORD*. In: Edinburgh University Centre for Cognitive Science Research Reports nr. 47, p. 1-29. Publ.: Edinburgh University.
- Kissin, G., *Upper and lower bounds on switching energy*. in: *VLSI*, J. ACM 38, p. 222-254.
- Kwast, K.L., *A deontic operator for database integrity*. in: J.-J. Ch. Meyer & R. Wieringa (eds.), *Proc. DEON'91: international workshop on deontic logic in computer science*, VU Amsterdam, Dec 11-13 1991, uitgave VU Amsterdam, p. 262-280
- Kwast, K.L., *The incomplete database*. in: *Proc. of the Int. Joint Conferences on AI, (IJCAI'91)*, August, Sydney, p. 897-902.
- Leeuwen, J.J.M. v., *Individuals and Sortal Concepts: An Essay in Logical Descriptive Metaphysics*, Dissertation UvA.
- Li, M. & P.M.B. Vitanyi, *A brief introduction to Kolmogorov complexity and its applications*. in: *Chinese Mathematics into the 21st Century*, Wu

- Wen-tsun and Cheng Min-de, Eds, Peking University Press, Peking, China, p. 67-84.
- Li, M. & P.M.B. Vitanyi, *Learning simple concepts under simple distributions*, SIAM J. Comput., 20, p. 911-935.
- Li, M. and P.M.B. Vitanyi, *Combinatorics and Kolmogorov complexity*. in: Proc. 6th IEEE Structures in Complexity Theory Conference, Chicago, p. 154-163.
- Mauw, S., F. Wiedijk, *Specification of the Transit Node in PSFd*. In: J.A. Bergstra, L.M.G. Feijs (eds.); *Algebraic Methods II: Theory, Tools and Applications*, Springer Lecture Notes in Computer Science 490, p. 341-361.
- Mauw, S., G.J. Veltink, *A Proof Assistant for PSF*. In: K.G. Larsen, A. Skou (eds.); Proc. Third Workshop on Computer Aided Verification, Aalborg, p. 200-211.
- Mauw, S., *PSF - A Process Specification Formalism*. Dissertation UvA.
- Mulder, H., *Specification of a Simple Overtaking Protocol using PSFd*. ESPRIT Basic Research Action No 3006, Task 1.4, 24 p.
- Oosten, J. v., *A semantical proof of de Jongh's theorem*. In: Archive for Mathematical Logic, 31, p. 105-114.
- Oosten, J. v., *Exercises in Realizability*. Dissertation UvA, pp.103.
- Oosten, J. v., *Extension of Lifschitz' realizability to higher order arithmetic, and a solution to a problem of F. Richman*. In: The Journal of Symbolic Logic, 56, p. 964-973.
- Prüst H. & M.H. van den Berg, *A Coherent Approach to Underspecification in Natural Language Discourse*. In: M. Caenepeel, et al (eds.), *Proceedings of the Workshop on Discourse Coherence.*, pp. ca 200. Publ.: University of Edinburgh.
- Rijke, M. de, (ed.) *Colloquium on Modal Logic 1991*, Nederlands AIO Netwerk voor Taal, Logica en Informatie.
- Rijke, M. de, *A Note on the Interpretability Logic of Finitely Axiomatized Theories*, *Studia Logica* , 50:2, p. 241-250.
- Rijke, M. de, *Completeness by completeness: Since and Until*. in: Rijke, M. de (ed.): *Colloquium on Modal Logic 1991*. Dutch Network for Logic, Language and Information, Amsterdam, p.279-285.
- Rodenburg, P.H., *A Simple Algebraic Proof of the Equational Interpolation Theorem*. *Algebra Universalis* 28, p. 48-51.
- Rodenburg, P.H., *Algebraic Specifiability of Data Types with Minimal Computable Parameters*. *TCS* 85, p. 97-116.

- Rodenburg, P.H., *Interpolation in Conditional Equational Logic*. Fundamenta Informatica xv, p. 80-85.
- Roorda, D., *Dyadic modalities and Lambek Calculus*. in: Rijke de, M. de (ed.): *Colloquium on modal logic*. Dutch Network for Logic, Language and Information, p.187-210.
- Roorda, D., *Lambek Calculus: proof-theoretical investigations*. Part I of DYANA deliverable R1.2.F, July 1991, p.3-43.
- Roorda, D., *Resource Logics: Proof-theoretical Investigations*. Dissertation UvA, pp.138.
- Sanchez Valencia, V., *Studies on Natural Logic and Categorical Grammar*. Dissertation UvA.
- Scha, R., *Artificiële Kunst*. In: *Zeezucht*, Jg. 4, pp. 29-34.
- Scha, R., *Computer-Taal/Computer-Language*. In: *Mediamatic*, Jg. 6, nr. 2/3, pp. 95-95.
- Scha, R., *Afterthoughts on Collections*. In: J.v.d.Does (ed.), *Quantification and Anaphora II.*, p. 53-58, Edinburgh.
- Schellinx, H. *Some syntactical observations on Linear Logic*. In: *Journal of Logic and Computation*, 1, p. 537-559.
- Schellinx, H., *Isomorphism and non-isomorphism of graph models*. In: *The Journal of Symbolic Logic*, 56, p. 227-249.
- Schellinx, H., R. Hoofman, *Collapsing graph models by preorders*. In: *Category Theory in Computer Science*, Springer-Verlag, Berlin, p. 53-73.
- Scholtes, J.C., *Filtering the Pravda with a Self-organizing Neural Net*. In: *Proceedings of the Bellcore Workshop on High Performance Filtering*. (S.T. Dumais & T.K. Landauer, eds), pp. 73,. Publ.: Bellcore, Morristown, NJ.
- Scholtes, J.C., *Kohonen Feature Maps and Full-Text Data Bases: A Case study of the 1987 Pravda*. In: G. Kempen & P. de Vroomen (eds), *Proceedings of the 1st Stinfon Conference on Information Sciences*, p. 203-220. Publ.: Stinfon, Den Haag.
- Scholtes, J.C., *Kohonen's Self-Organizing Feature Map Applied Towards Natural Language processing*. (J. Foder ed.). In: *Proceedings of the CUNY Conference on Sentence Processing*, p. 1-10. Publ.: University of Rochester, Rochester.
- Scholtes, J.C., *Kohonen's Self-organizing Map in Natural Language Processing*. In: *Proceedings van de 1e Conferentie van de SNN*. (G. Gielen ed.), p. 64-64. Publ.: SNN, Nijmegen.

- Scholtes, J.C., *Learning Simple Semantics by Self-organization*. (B. Allen & C.P. Dolan eds). In: *Proceedings of the AAAI Spring Symposium on Connectionist Natural Language Processing*, p. 78-83. Publ.: AAAI, Palo Alto, CA. Also appeared in: D. Powers: *Proceedings of the AAAI Symposium on Machine Learning of Natural Language Processing and Ontology*, p. 146-151. Publ.: AAAI, Palo Alto CA.
- Scholtes, J.C., *Recurrent Kohonen Self-Organization in Natural Language Processing*. In: T. Kohonen (ed.), *Proceedings of the ICANN.*, p. 1751-1754. Publ.: Elsevier Science Publ., Amsterdam.
- Scholtes, J.C., *Self-Organized Language Learning*. In: F. Streier (ed.), *Proceedings of the Annual Conference on Cybernetics*, p. 114-114. Publ.: American Society of Cybernetics, Amherst, MA.
- Scholtes, J.C., *Unsupervised Context Learning in Natural Language Processing*. In: D. Rumelhart (ed.), *Proceedings of the IJCNN*, p. 107-112. Publ.: IEEE/INNS, Seattle, WA.
- Scholtes, J.C., *Unsupervised Learning and the Information Retrieval Problem*. In: T.S. Low (ed.), *Proceedings of the IJCNN Singapore 91*, p. 95-100. Publ.: IEEE/INNS, Singapore.
- Scholtes, J.C., *Using Extended Kohonen Feature Map in a Language Acquisition Model*. In: *Proceedings of the 2nd Australian Conference on Neural Networks*, p. 38-43. Publ.: University of Sydney, Sydney.
- Smith, N., M. Beers, L.W.M. Bod, R. Bolognesi, H. Humbert, F. van der Leeuw, *Lenition in a Sardinian dialect*. In: P.M. Bertinetto, M. Kenstowicz & M. Lopocaro (eds.), *Certamen Phonologicum II*, p. 309-328. Publ.: Rosenberg & Sellier, Turiijn.
- Spaan, E., *The complexity of propositional tense logics*. in: M. de Rijke (ed.), *Colloquium on modal logic 1991*, Dutch network for language, logic and information, p. 239-252
- Stokhof, M.J.B., J.A.G. Groenendijk & D. Beaver (eds.), *Quantification and Anaphora I*, Dyana deliverable R2.2.A (revised version); to: E.C. Commission, pp. 195 + viii, Centre for Cognitive Science, University of Edinburgh.
- Swaen, M.D.G., *The logic of first order intuitionistic type theory with weak sigma-elimination*. In: *The Journal of Symbolic Logic*, 56, p. 467-483.
- Veltink, G.J., *XP, an Experiment in Modular Specification*. In: K. Parker, G. Rose (eds.), *Proceedings of the Fourth Int. Conf. on Formal Description Techniques FORTE'91*, Sydney, p. 153-168.

- Veltman, F. & E. Klein (eds.); *Natural Language and Speech*. Proceedings of ESPRIT Symposium, Brussels, Springer-Verlag, Heidelberg, 192 p.
- Veltman, F. & M. Morreau, *Common Sense Entailment and Update Semantics*, DYANA Deliv. R2.5.C. Rep: E.C. Commission. DG XIII. 68 p.
- Veltman, F., M. Clarke, P. Gärdenfors & J. Delgrande, *Conditionals and Belief Revision*. *Journal of Applied Non-classical Logic*, 1, 2, p. 83-116.
- Venema, Y., *A modal logic for chopping intervals*. in: *Journal of Logic and Computation*, 1, p. 453-476.
- Venema, Y., *Many-dimensional Modal Logic*. Dissertation UvA.
- Vrancken, J.L.M., *Studies in Process Algebra, Algebraic Specifications and Parallelism*. Dissertation UvA.
- Vrijer, R.C. de, A. Middeldorp, Y. Toyama & J.W. Klop, *A simplified proof of Toyama's theorem*. Esprit Basic Research Action 3020, Final Report Deliverance D2.3.2., Report to: EC Commission DG XII.
- Vrijer, R.C. de, J.W. Klop, *Extended Term Rewriting Systems*. In: S. Kaplan, M. Okada (eds.), *Conditional and Typed Rewriting Systems, Proceedings of the Second International CTRS Workshop*, Montreal, 1990, Springer LNCS 516, Heidelberg, p. 26-50.
- Wiedijk, F., *Persistence in Algebraic Specifications*. Dissertation UvA.
- Zeevat, H.W., *Aspects of Discourse Representation Theory and Unification Grammar*, pp. 215, Dissertation UvA.
- Zeevat, H.W., *Combining Semantics by Unification*. In: T. v.d. Wouden & W. Sijtsma, (eds.), *Computational Linguistics in the Netherlands*, p. 161-176, OTS, Utrecht.
- Zeevat, H.W., E. Klein & J. Calder, *Unification Categorical Grammar*. In: *Linguae Stile*, jg. XXVI, nr. 4, p. 499-527.
- Zhisheng Huang & K. L. Kwast, *Awareness, negation and logical omniscience*. in: J. van Eijck (ed.), *Logics in AI, European Workshop JELIA '90*, Springer LCS 478, p. 282-300.
- Zhisheng Huang, *Logics for belief dependence*. in: E. Borger, H. Kleine Buning, M.M.Richter & W. Schonfeld (eds.): *Proc. CSL '90, 4th workshop on computer science and logic*, Heidelberg, October 1990. Springer LCS 533, p.274-288.
- Zhisheng Huang, *Reasoning about Knowledge*, Chinese Computer Science, vol. 1, p.46-48. (in Chinese)

7.2 New Titles Prepublication Series

Logic, Semantics and Philosophy of Language

- LP-91-01 Wiebe van der Hoek, Maarten de Rijke *Generalized Quantifiers and Modal Logic*
- LP-91-02 Frank Veltman *Defaults in Update Semantics*
- LP-91-03 Willem Groeneveld *Dynamic Semantics and Circular Propositions*
- LP-91-04 Makoto Kanazawa *The Lambek Calculus enriched with Additional Connectives*
- LP-91-05 Zhisheng Huang, Peter van Emde Boas *The Schoenmakers Paradox: Its Solution in a Belief Dependence Framework*
- LP-91-06 Zhisheng Huang, Peter van Emde Boas *Belief Dependence, Revision and Persistence*
- LP-91-07 Henk Verkuyl, Jaap van der Does *The Semantics of Plural Noun Phrases*
- LP-91-08 Víctor Sánchez Valencia *Categorial Grammar and Natural Reasoning*
- LP-91-09 Arthur Nieuwendijk *Semantics and Comparative Logic*
- LP-91-10 Johan van Benthem *Logic and the Flow of Information*

Mathematical Logic and Foundations

- ML-91-01 Yde Venema *Cylindric Modal Logic*
- ML-91-02 Alessandro Berarducci, Rineke Verbrugge *On the Metamathematics of Weak Theories*
- ML-91-03 Domenico Zambella *On the Proofs of Arithmetical Completeness for Interpretability Logic*
- ML-91-04 Raymond Hoofman, Harold Schellinx *Collapsing Graph Models by Preorders*
- ML-91-05 A.S. Troelstra *History of Constructivism in the Twentieth Century*
- ML-91-06 Inge Bethke *Finite Type Structures within Combinatory Algebras*
- ML-91-07 Yde Venema *Modal Derivation Rules*
- ML-91-08 Inge Bethke *Going Stable in Graph Models*

ML-91-09 V.Yu. Shavrukov *A Note on the Diagonalizable Algebras of PA and ZF*

ML-91-10 Maarten de Rijke, Yde Venema *Sahlqvist's Theorem for Boolean Algebras with Operators*

ML-91-11 Rineke Verbrugge *Feasible Interpretability*

ML-91-12 Johan van Benthem *Modal Frame Classes, revisited*

Computation and Complexity Theory

CT-91-01 Ming Li, Paul M.B. Vitányi *Kolmogorov Complexity Arguments in Combinatorics*

CT-91-02 Ming Li, John Tromp, Paul M.B. Vitányi *How to Share Concurrent Wait-Free Variables*

CT-91-03 Ming Li, Paul M.B. Vitányi *Average Case Complexity under the Universal Distribution Equals Worst Case Complexity*

CT-91-04 Sieger van Denneheuvel, Karen Kwast *Weak Equivalence*

CT-91-05 Sieger van Denneheuvel, Karen Kwast *Weak Equivalence for Constraint Sets*

CT-91-06 Edith Spaan *Census Techniques on Relativized Space Classes*

CT-91-07 Karen L. Kwast *The Incomplete Database*

CT-91-08 Kees Doets *Levotionis Laus*

CT-91-09 Ming Li, Paul M.B. Vitányi *Combinatorial Properties of Finite Sequences with high Kolmogorov Complexity*

CT-91-10 John Tromp, Paul Vitányi *A Randomized Algorithm for Two-Process Wait-Free Test-and-Set*

CT-91-11 Lane A. Hemachandra, Edith Spaan *Quasi-Injective Reductions*

CT-91-12 Krzysztof R. Apt, Dino Pedreschi *Reasoning about Termination of Prolog Programs*

Computational Linguistics

CL-91-01 J.C. Scholtes *Kohonen Feature Maps in Natural Language Processing*

CL-91-02 J.C. Scholtes *Neural Nets and their Relevance for Information Retrieval*

CL-91-03 Hub Prüst, Remko Scha, Martin van den Berg *A Formal Discourse Grammar tackling Verb Phrase Anaphora*

Other Prepublications

- X-91-01 Alexander Chagrov, Michael Zakharyashev *The Disjunction Property of Intermediate Propositional Logics*
- X-91-02 Alexander Chagrov, Michael Zakharyashev *On the Undecidability of the Disjunction Property of Intermediate Propositional Logics*
- X-91-03 V. Yu. Shavrukov *Subalgebras of Diagonalizable Algebras of Theories containing Arithmetic*
- X-91-04 K.N. Ignatiev *Partial Conservativity and Modal Logics*
- X-91-05 Johan van Benthem *Temporal Logic*
- X-91-06 *Annual Report 1990*
- X-91-07 A.S. Troelstra *Lectures on Linear Logic, Errata and Supplement*
- X-91-08 Giorgie Dzhaparidze *Logic of Tolerance*
- X-91-09 L.D. Beklemishev *On Bimodal Provability Logics for P_1 -axiomatized Extensions of Arithmetical Theories*
- X-91-10 Michiel van Lambalgen *Independence, Randomness and the Axiom of Choice*
- X-91-11 Michael Zakharyashev *Canonical Formulas for K_4 . Part I: Basic Results*
- X-91-12 Herman Hendriks *Flexibele Categoriale Syntaxis en Semantiek: de proefschriften van Frans Zwarts en Michael Moortgat*
- X-91-13 Max I. Kanovich *The Multiplicative Fragment of Linear Logic is NP-Complete*
- X-91-14 Max I. Kanovich *The Horn Fragment of Linear Logic is NP-Complete*
- X-91-15 V. Yu. Shavrukov *Subalgebras of Diagonalizable Algebras of Theories containing Arithmetic, revised version*
- X-91-16 V.G. Kanovei *Undecidable Hypotheses in Edward Nelson's Internal Set Theory*
- X-91-17 Michiel van Lambalgen *Independence, Randomness and the Axiom of Choice, Revised Version*
- X-91-18 Giovanna Cepparello *New Semantics for Predicate Modal Logic: an Analysis from a standard point of view*
- X-91-19 Papers presented at the Provability Interpretability Arithmetic Conference, 24-31 Aug. 1991, Dept. of Phil., Utrecht University

7.3 New Dissertations

The following Ph.D. projects were completed in 1991:

- R. Bol, *Loop Checking in Logic Programming*, CWI, promotor: prof. dr. K. Apt
- S. van Denneheuvel, *Constraint solving on Database Systems; Design and Implementation of the Rule Language RL/1*, UvA, promotor: dr. P. van Emde Boas
- J.-F. Groote, *Process Algebra and Structured Operational Semantics*, CWI, promotores: prof. dr. J.C.M. Baeten, prof. dr. J.A. Bergstra
- J. van Leeuwen, *Individuals and Sortal Concepts*, UvA, promotor: prof. dr. R.I. Bartsch
- S. Mauw, *PSF - A Process Specification Formalism*, UvA, promotores: prof. dr. J.A. Bergstra, prof. dr. J.C.M. Baeten
- J. van Oosten, *Exercises in Realizability*, UvA, promotor: prof. dr. A.S. Troelstra
- D. Roorda, *Resource Logics: Proof-theoretical Investigations*, UvA, promotores: prof.dr. J.F.A.K. van Benthem, prof. dr. A.S. Troelstra
- Y. Venema, *Many-dimensional Modal Logic*, UvA, promotor: prof. dr. J.F.A.K. van Benthem
- J. Vrancken, *Studies in Process Algebra, Algebraic Specifications and Parallelism*, UvA, promotores: prof. dr. J.A. Bergstra, prof. dr. P. Klint
- F. Wiedijk, *Persistence in Algebraic Specifications*, UvA, promotores: prof. dr. J.A. Bergstra, prof. dr. P. Klint
- H. Zeevat, *Aspects of Discourse Semantics and Unification Grammar*, UvA, promotor: prof. dr. R.I. Bartsch

7.4 DYANA Research project

This project in Esprit Basic Research is concerned with the foundations of natural language interpretation and its consequences for knowledge representation. The programme of work will focus on partial information and dynamic interpretation in natural language processing, with particular attention to developing a formal theory of natural language interpretation which attempts to model human cognitive abilities while admitting computational implementation. The project is a continuation of the ESPRIT BRA 3175, Dynamic Interpretation of Natural Language. The more specific objectives set for the second phase of DYANA are:

- To determine the aspects of the structure of cognitive information states relevant to natural language interpretation.
- To examine specific semantic and pragmatic phenomena which currently prevent the effective use of natural language in human-computer interaction.
- To develop sufficient understanding of the logical and computational properties of sign-based architectures to allow their application across all components of the grammar.
- To demonstrate the utility of sign-based grammar architecture by providing a principled account of cross-linguistic variation.
- To integrate information from all components of the grammar to efficiently determine utterance meaning.

Research is carried out on an interdisciplinary, collaborative basis using concepts and tools from linguistics, logic, and computer science.

The following institutions make up the core consortium of the project:

- University of Amsterdam, Institute for, Language, Logic and Computation
- University of Edinburgh, Centre for Cognitive Science
- University of München, Centrum für Informations- und Sprachverarbeitung (CIS)
- University of Oslo, Institutt for Lingvistikk og Filosofi
- University of Stuttgart, Institut für Maschinelle Sprachverarbeitung
- University of Tübingen, Seminar für Natürlich-sprachliche Systeme
- University of Utrecht, Onderzoeksinstituut voor Taal en Spraak

Participation in this project brought ILLC 2,5 new jobs at post-doc level.

7.5 Esprit Network of Excellence in Language and Speech

ILLC is one of the managing nodes in the European Network in Language and Speech (ELSNET), which was established in April 1991 with funding from ESPRIT Basic Research. ELSNET has the objective of coordinating European research and postgraduate training activities which promote the development of speech and natural language (NL) technology. The long-term goal which motivates the Network is the construction of integrated multilingual speech and NL systems with unrestricted coverage of both spoken and written language. The Network represents a huge pool of expertise and research experience, ranging from advanced techniques in speech analysis and production through language modelling and robust parsing to sophisticated dialogue and discourse representation.

The Network's main activities are organized around four Task Groups concerned with Research Coordination, Training and Mobility, Linguistic and Speech Resources, and Industrial Affiliates.

7.6 Conferences

From December 17 to December 20 1991 the Eighth Amsterdam Colloquium took place. At the Eighth Amsterdam Colloquium seven invited and 40 contributed papers were presented. The contributed papers will be published as an in-house publication, they may be expected to appear early summer 1992.

Editors of the volume are Paul Dekker and Martin Stokhof. For further information, contact

Marjorie Pigge, telephone: (0)20 5254552 or
Paul Dekker, email: dekker@illc.uva.nl,
Department of Philosophy,
Nieuwe Doelenstraat 15,
1012 CP Amsterdam.

In 1991, the Programming Research group organised CONCUR '91, the Second International Conference on Concurrency Theory. This conference took place on August 26-29, and was visited by 100 participants. The Proceedings have appeared as Springer Lecture Notes in Computer Science, vol. 527 (Jos Baeten and Jan-Friso Groote, eds.).

7.7 Colloquia

ITLI-Colloquium

Department of Philosophy

László Pólos (Eötvös Loránd Universiteit, Boedapest) *Deferred Information and Embedded Situations*

Jan van Eijck & Fer-Jan de Vries *Dynamische Interpretatie en Horn-Logica*

Heinrich Wansing (Freie Universität Berlin) *Informational Interpretation of Substructural Logics;*

Jay David Atlas (Pomona College, Claremont, Californië) *G.E. Moore, L. Wittgenstein and H.P. Price: Foundations of Contemporary Pragmatics*

Harold Schellinx (FWI, UvA) *Linear Logic: Introduction*

Dirk Roorda (FWI, UvA) *Lambek Calculus and Boolean Connectives*

Valeria de Paiva (Cambridge, UK) *Linear Logic and Categorical Grammar*

Richard Crouch (SRI, Cambridge, UK) *Tense Logic and Conditionals*

Bill Purdy (Syracuse University, NY) *Surface Reasoning*

Wilfried Meyer Viol (OTS, CWI, Amsterdam) *Non-monotonic Reasoning and Semantics of Natural Language*

Ray Turner (University of Essex) *Truth and Knowledge*

Renate Bartsch (FdW, UvA) *Facts and Events*

Colloquium Semantic Parallels in Natural Language and Programming

Department of Philosophy, Centre for Mathematics and Computer Science

Peter van Emde Boas (UvA) *Variabelen, scope en binding in programmeertalen: The Continuing Story*

Krzysztof Apt *Reasoning about Static and Dynamic Scoping in Programming Languages*

Tim Fernando *Transition Systems*

René Leermakers *Lambek Calculus and Parsing*

Albert Visser *Incremental Semantics*

Colloquium Intensional Logic

Department of Mathematics and Computer Science

Jan Jaspars *Fused Modal Logic*

Catholijn Jonker *Well-Founded Semantics for Truth Maintenance*

Gerard Vreeswijk *The Feasibility of Defeat in Defeasible Reasoning*

Elias Thijsse (ITK/KUB) *Awareness Logics*

Dirk Roorda *Dyadic Modalities and Lambek Calculus*

Marcus Kracht (Freie Universität Berlin) *Transferring Completeness*
Patrick Blackburn (Centre for Cognitive Science, Edinburgh/RUU)
Alessandra Ciuppi (University of Siena) *Anomalies of the Until Operator*
Patrick Blackburn *Reference and Quantification in Tense Logic*
Yde Venema *Rules for the Undefinable*

Logic Intercity Colloquium

Department of Mathematics and Computer Science

A. Berarducci *A Survey of Number Theory in Bounded Arithmetic*
V.Yu. Shavrukov (Steklov Institute, Moskou) *Diagonizable Algebras I*
V.Yu. Shavrukov (Steklov Institute, Moskou) *Diagonizable Algebras II*
J.W. Addison (Berkeley) *The riddle of separation principles*
D. Roorda *Interpolation in classical Linear Logic*;
A. Weiermann (Münster) *Verallgemeinerungen des Kruskal-Satzes*
K. Stroetmann (Münster) *A completeness for SLDNF-resolution*
M. Makkai (Montreal) *Duality and Definability in First Order Logic*

Arithmetic Colloquium

Department of Mathematics and Computer Science

Marc Jumelet *Sylvester/Woods/Macintyre on Euclid IV*
Domenico Zambella *Berarducci and Visser without bisimulation*
Alessandro Berarducci *Weak Fragments of Arithmetics*
Domenico Zambella *Berarducci/Shavrukov without bisimulation*
Alessandro Berarducci *Δ_0 -definitions of some functions other than exponentiation*
Volodja Shavrukov *Diagonizable Algebras of PA, ZF are nonisomorphic*
Peter Clote *Belt'yukov Machines and Parallel Computation*
Domenico Zambella *Shavrukov's Theorem*
Lev Beklemishev *Bimodal Logics for Pairs of Arithmetical Theories*,

Montague Colloquium

Department of Philosophy

Patrick Blackburn *Modal Logic for Linguistic Theorizing*
David Beaver *The Kinematics of Presupposition*
Henk Verkuyl *Type Shifting and Aspectual Point of View*
Tanya Reinhart *Intrasentential Anaphora*
Peter Blok *An epistemic account of the Presuppositions of Focus Constructions*

7.8 Visitors

In 1991, the following people visited ILLC for a shorter or a longer period of time:

N. Alyoshina (Moscow)	M. Kracht (Berlin)
S. Abramsky (London)	A. Kratzer (Amherst, Mass.)
J. Acero (Granada)	S. Lapierre (Montreal)
J. Addison (Berkeley)	P. Lucas (IBM Almaden Research Center)
K. Ambos Spies	A. Mateescu (Bucharest)
S. N. Artemov (Moscow)	L. Polos (Budapest)
L. Beklemishev (Moscow)	A. Prijatelj (Ljubljana)
A. Berarducci (l'Aquila)	P. Pudlák (Prague)
P. Blackburn (Edinburgh)	T. Reinhart (Tel Aviv University)
A. Borzyszkowski (Polish Academy Gdansk)	G. E. Sacks (Harvard)
G. Cepparello (Pisa)	V. Shehtman (Moscow)
G. Chierchia (Ithaca, N.Y.)	V. Yu. Shavrukov (Moscow)
G. D'Agostino (Sienna)	K. Stroetman (Münster)
K. Dosen (Belgrado)	B. Thompson (University College of Swansea)
K. Futatsugi (NTT, Japan)	R. Turner (University of Essex)
P. C. Gilmore (Vancouver)	J. Tucker (University College of Swansea)
I. Heim (Boston)	H. Wansing (Berlin)
A. Knobel (Electrotechnical Laboratory Tzukuba)	

7.9 Ph.D projects

The following projects were executed under the supervision of ILLC staff:

- Pieter Adriaans *Semantic driven parsing and modelling*
- Rens Bod *Observation of structures in language and music*
- Harry Buhrman *Developing tools in structural complexity theory*
- Paul Dekker *Flexibility in syntax and semantics*
- Nicolien Drost *Formal models*
- Martin v.d. Berg *Text structure and dynamic semantics*
- Willem Groeneveld *Logical investigations in dynamic semantics*
- Herman Hendriks *Flexible interpretation*
- Marianne Kalsbeek *Bounded proof predicates*
- Wilco Koorn *Programming environments*

- H. Kuiper *Formal models*
- Karen Kwast *Non-classical logic for database semantics*
- Michiel Leezenberg *Formal semantics and pragmatics of metaphor*
- Neza van der Leeuw *A data oriented theory of first language acquisition*
- Noor van Leusen *Retraction and accomodation in a computational model of dialogue semantics*
- Jaap Maat *Universalism and relativism*
- Arthur Niewendijk *Philosophical foundations of logical theories*
- Hub Prüst *Semantic discourse representation*
- Maarten de Rijke *Enriched modal formalisms*
- Harold Schellinx *Linear logic and type theory*
- Jan Scholtes *Connectionism and natural language processing*
- Frederik Somsen *Efficient implementation of pattern matching algorithms for large language corpora*
- Edith Spaan *Complexity of logical systems*
- Gert Veltink *Formal models*
- Rineke Verbrugge *Interpretability and bounded arithmetic*
- Chris Verhoef *Formal models*
- Emile Verschuren *Programming environments*
- Jos van Wamel *Formal models*
- Huang Zhiseng *Non-classical logic for database semantics*

Joint projects with other institutes include:

- Yao-Hua Tan (Free University Amsterdam) *Non-monotonic reasoning; its sources and logical structure*
- Elias Thijssen (University of Tilburg) *Knowledge representation and epistemic logic*
- Michael Morreau (University of Stuttgart) *Non-monotonic reasoning*
- Heinrich Wansing (Free University Berlin) *Logic of information structures*
- Wiebe van der Hoek (Free University Amsterdam) *Modalities for reasoning about knowledge and quantities*

8 Past Activities

8.1 Ph. D. Theses

1989

Reinhard Muskens, *Meaning and Partiality*

Eleonore Oversteegen, *Tracking Time*

Michiel Smid, *Dynamic Data Structures on Multiple Storage Media*

Marco Swaen, *Weak and Strong Sum-elimination in Intuitionistic Type Theory*

1990

Wieb Bosma, Marc-Paul van der Hulst *Primality Proving with Cyclotomy*

Kees van Deemter *On the Composition of Meaning*

Sjaak de Mey *Determiner Logic or the Grammar of the NP*

Victor Sanchez Valencia *Studies on Natural Logic and Categorical Grammar*

8.2 Prepublication Series

1986

86-01 The Institute of Language, Logic and Information

86-02 Peter van Emde Boas *A Semantical Model for Integration and Modularization of Rules*

86-03 Johan van Benthem *Categorical Grammar and Lambda Calculus*

86-04 Reinhard Muskens *A Relational Formulation of the Theory of Types*

86-05 Kenneth A. Bowen, Dick de Jongh *Some Complete Logics for Branched Time, Part I Well-founded Time, Forward looking Operators*

86-06 Johan van Benthem *Logical Syntax*

1987

87-01 Jeroen Groenendijk, Martin Stokhof *Type shifting Rules and the Semantics of Interrogatives*

87-02 Renate Bartsch *Frame Representations and Discourse Representations*

87-03 Jan Willem Klop, Roel de Vrijer *Unique Normal Forms for Lambda Calculus with Surjective Pairing*

87-04 Johan van Benthem *Polyadic quantifiers*

87-05 Víctor Sánchez Valencia *Traditional Logicians and de Morgan's Example*

87-06 Eleonore Oversteegen *Temporal Adverbials in the Two Track Theory of Time*

87-07 Johan van Benthem *Categorical Grammar and Type Theory*

87-08 Renate Bartsch *The Construction of Properties under Perspectives*

87-09 Herman Hendriks *Type Change in Semantics: The Scope of Quantification and Coordination*

1988 Logics, Semantics and Philosophy of Language

LP-88-01 Michiel van Lambalgen *Algorithmic Information Theory*

LP-88-02 Yde Venema *Expressiveness and Completeness of an Interval Tense Logic*

LP-88-03 *Annual Report 1987*

LP-88-04 Reinhard Muskens *Going partial in Montague Grammar*

LP-88-05 Johan van Benthem *Logical Constants across Varying Types*

LP-88-06 Johan van Benthem *Semantic Parallels in Natural Language and Computation*

LP-88-07 Renate Bartsch *Tenses, Aspects, and their Scopes in Discourse*

LP-88-08 J. Groenendijk, M. Stokhof *Context and Information in Dynamic Semantics*

LP-88-09 Theo M.V. Janssen *A mathematical model for the CAT framework of Eurotra*

LP-88-10 Anneke Kleppe *A Blissymbolics Translation Program*

Mathematical Logic and Foundations

ML-88-01 Jaap van Oosten *Lifschitz' Realizability*

ML-88-02 M.D.G. Swaen *The Arithmetical Fragment of Martin Löf's Type Theories with weak Σ -elimination*

ML-88-03 D. de Jongh & F. Veltman *Provability Logics for Relative Interpretability*

ML-88-04 A.S. Troelstra *On the Early History of Intuitionistic Logic*

ML-88-05 A.S. Troelstra *Remarks on Intuitionism and the Philosophy of Mathematics*

Computation and Complexity Theory

CT-88-01 Ming Li, Paul M.B. Vitanyi *Two Decades of Applied Kolmogorov Complexity*

CT-88-02 Michiel H.M. Smid *General Lower Bounds for the Partitioning of Range Trees*

CT-88-03 Michiel H.M. Smid, Mark H. Overmars, Leen Torenvliet, Peter van Emde Boas *Maintaining Multiple Representations of Dynamic Data Structures*

CT-88-04 Dick de Jongh, Lex Hendriks, Gerard R. Renardel de Lavalette *Computations in Fragments of Intuitionistic Propositional Logic*

CT-88-05 Peter van Emde Boas *Machine Models and Simulations (revised version)*

CT-88-06 Michiel H.M. Smid *A Data Structure for the Union-find Problem having good Single-Operation Complexity*

CT-88-07 Johan van Benthem *Time, Logic and Computation*

CT-88-08 Michiel H.M. Smid, Mark H. Overmars, Leen Torenvliet, Peter van Emde Boas *Multiple Representations of Dynamic Data Structures*

CT-88-09 Theo M.V. Janssen *A Universal Parsing Algorithm for Functional Grammar*

CT-88-10 Edith Spaan, Leen Torenvliet, Peter van Emde Boas *Nondeterminism, Fairness and a Fundamental Analogy*

CT-88-11 Sieger van Denneheuvel, Peter van Emde Boas *Towards implementing RL*

Other Publications

X-88-01 Marc Jumelet *On Solovay's Completeness Theorem*

1989 Logics, Semantics and Philosophy of Language

LP-89-01 Johan van Benthem *The Fine-Structure of Categorical Semantics*

LP-89-02 Jeroen Groenendijk, Martin Stokhof *Dynamic Predicate Logic, towards a compositional, non-representational semantics of discourse*

LP-89-03 Yde Venema *Two-dimensional Modal Logics for Relation Algebras and Temporal Logic of Intervals*

LP-89-04 Johan van Benthem *Language in Action*

LP-89-05 Johan van Benthem *Modal Logic as a Theory of Information*

LP-89-06 Andreja Prijatelj *Intensional Lambek Calculi: Theory and Application*

LP-89-07 Heinrich Wansing *The Adequacy Problem for Sequential Propositional Logic*

LP-89-08 Víctor Sánchez Valencia *Peirce's Propositional Logic: From Algebra to Graphs*

LP-89-09 Zhisheng Huang *Dependency of Belief in Distributed Systems*

Mathematical Logic and Foundations

ML-89-01 Dick de Jongh, Albert Visser *Explicit Fixed Points for Interpretability Logic*

ML-89-02 Roel de Vrijer *Extending the Lambda Calculus with Surjective Pairing is conservative*

ML-89-03 Dick de Jongh, Franco Montagna *Rosser Orderings and Free Variables*

ML-89-04 D. de Jongh, M. Jumelet & F. Montagna *On the Proof of Solovay's Theorem*

ML-89-05 Rineke Verbrugge *S-completeness and Bounded Arithmetic*

ML-89-06 Michiel van Lambalgen *The Axiomatization of Randomness*

ML-89-07 Dirk Roorda *Elementary Inductive Definitions in HA: from Strictly Positive towards Monotone*

ML-89-08 Dirk Roorda *Investigations into Classical Linear Logic*
ML-89-09 Alessandra Carbone *Provable Fixed points in ID_0+W_1*

Computation and Complexity Theory

CT-89-01 Michiel H.M. Smid *Dynamic Deferred Data Structures*
CT-89-02 Peter van Emde Boas *Machine Models and Simulations*
CT-89-03 Ming Li, Herman Neuféglise, Leen Torenvliet, Peter van Emde Boas *On Space Efficient Simulations*
CT-89-04 Harry Buhrman, Leen Torenvliet *A Comparison of Reductions on Nondeterministic Space*
CT-89-05 Pieter H. Hartel, Michiel H.M. Smid, Leen Torenvliet, Willem G. Vree *A Parallel Functional Implementation of Range Queries*
CT-89-06 H.W. Lenstra, Jr. *Finding Isomorphisms between Finite Fields*
CT-89-07 Ming Li, Paul M.B. Vitanyi *A Theory of Learning Simple Concepts under Simple Distributions and Average Case Complexity for the Universal Distribution*
CT-89-08 Harry Buhrman, Steven Homer, Leen Torenvliet *Honest Reductions, Completeness and Nondeterministic Complexity Classes*
CT-89-09 Harry Buhrman, Edith Spaan, Leen Torenvliet *On Adaptive Resource Bounded Computations*
CT-89-10 Sieger van Denneheuvel *The Rule Language RL/1*
CT-89-11 Zhisheng Huang, Sieger van Denneheuvel, Peter van Emde Boas *Towards Functional Classification of Recursive Query Processing*

Other Publications

X-89-01 Marianne Kalsbeek *An Orey Sentence for Predicative Arithmetic*
X-89-02 G. Wagemakers *New Foundations: a Survey of Quine's Set Theory*
X-89-03 A.S. Troelstra *Index of the Heyting Nachlass*
X-89-04 Jeroen Groenendijk, Martin Stokhof *Dynamic Montague Grammar, a first sketch*
X-89-05 Maarten de Rijke *The Modal Theory of Inequality*
X-89-06 Peter van Emde Boas *Een Relationele Semantiek voor Conceptueel Modelleren Het RL-project*

1990 Logics, Semantics and Philosophy of Language

LP-90-01 Jaap van der Does *A Generalized Quantifier Logic for Naked Infinitives*
LP-90-02 Jeroen Groenendijk, Martin Stokhof *Dynamic Montague Grammar*
LP-90-03 Renate Bartsch *Concept Formation and Concept Composition*
LP-90-04 Aarne Ranta *Intuitionistic Categorical Grammar*
LP-90-05 Patrick Blackburn *Nominal Tense Logic*
LP-90-06 Gennaro Chierchia *The Variability of Impersonal Subjects*
LP-90-07 Gennaro Chierchia *Anaphora and Dynamic Logic*
LP-90-08 Herman Hendriks *Flexible Montague Grammar*
LP-90-09 Paul Dekker *The Scope of Negation in Discourse, towards a flexible dynamic Montague grammar*
LP-90-10 Theo M.V. Janssen *Models for Discourse Markers*
LP-90-11 Johan van Benthem *General Dynamics*
LP-90-12 Serge Lapierre *A Functional Partial Semantics for Intensional Logic*
LP-90-13 Zhisheng Huang *Logics for Belief Dependence*
LP-90-14 Jeroen Groenendijk, Martin Stokhof *Two Theories of Dynamic Semantics*
LP-90-15 Maarten de Rijke *The Modal Logic of Inequality*
LP-90-16 Zhisheng Huang, Karen Kwast *Awareness, Negation and Logical Omniscience*
LP-90-17 Paul Dekker *Existential Disclosure, Implicit Arguments in Dynamic Semantics*

Mathematical Logic and Foundations

ML-90-01 Harold Schellinx *Isomorphisms and Non-Isomorphisms of Graph Models*

- ML-90-02 Jaap van Oosten *A Semantical Proof of De Jongh's Theorem*
- ML-90-03 Yde Venema *Relational Games*
- ML-90-04 Maarten de Rijke *Unary Interpretability Logic*
- ML-90-05 Domenico Zambella *Sequences with Simple Initial Segments*
- ML-90-06 Jaap van Oosten *Extension of Lifschitz' Realizability to Higher Order Arithmetic, and a Solution to a Problem of F. Richman*
- ML-90-07 Maarten de Rijke *A Note on the Interpretability Logic of Finitely Axiomatized Theories*
- ML-90-08 Harold Schellinx *Some Syntactical Observations on Linear Logic*
- ML-90-09 Dick de Jongh, Duccio Pianigiani *Solution of a Problem of David Guaspari*
- ML-90-10 Michiel van Lambalgen *Randomness in Set Theory*
- ML-90-11 Paul C. Gilmore *The Consistency of an Extended NaDSet*

Computation and Complexity Theory

- CT-90-01 John Tromp, Peter van Emde Boas *Associative Storage Modification Machines*
- CT-90-02 Sieger van Denneheuvel, Gerard R. Renardel de Lavalette
A Normal Form for PCSJ Expressions
- CT-90-03 Ricard Gavaldà, Leen Torenvliet, Osamu Watanabe, José L. Balcázar
Generalized Kolmogorov Complexity in Relativized Separations
- CT-90-04 Harry Buhrman, Edith Spaan, Leen Torenvliet *Bounded Reductions*
- CT-90-05 Sieger van Denneheuvel, Karen Kwast *Efficient Normalization of Database and Constraint Expressions*
- CT-90-06 Michiel Smid, Peter van Emde Boas *Dynamic Data Structures on Multiple Storage Media, a Tutorial*
- CT-90-07 Kees Doets *Greatest Fixed Points of Logic Programs*
- CT-90-08 Fred de Geus, Ernest Rotterdam, Sieger van Denneheuvel, Peter van Emde Boas
Physiological Modelling using RL
- CT-90-09 Roel de Vrijer *Unique Normal Forms for Combinatory Logic with Parallel Conditional, a case study in conditional rewriting*

Other Publications

- X-90-01 A.S. Troelstra *Remarks on Intuitionism and the Philosophy of Mathematics, Revised Version*
- X-90-02 Maarten de Rijke *Some Chapters on Interpretability Logic*
- X-90-03 L.D. Beklemishev *On the Complexity of Arithmetical Interpretations of Modal Formulae*
- X-90-04 *Annual Report 1989*
- X-90-05 Valentin Shehtman *Derived Sets in Euclidean Spaces and Modal Logic*
- X-90-06 Valentin Goranko, Solomon Passy *Using the Universal Modality: Gains and Questions*
- X-90-07 V.Yu. Shavrukov *The Lindenbaum Fixed Point Algebra is Undecidable*
- X-90-08 L.D. Beklemishev *Provability Logics for Natural Turing Progressions of Arithmetical Theories*
- X-90-09 V.Yu. Shavrukov *On Rosser's Provability Predicate*
- X-90-10 Sieger van Denneheuvel, Peter van Emde Boas *An Overview of the Rule Language RL/1*
- X-90-11 Alessandra Carbone *Provable Fixed points in ID_0+W_1 , revised version*
- X-90-12 Maarten de Rijke *Bi-Unary Interpretability Logic*
- X-90-13 K.N. Ignatiev *Dzhaparidze's Polymodal Logic: Arithmetical Completeness, Fixed Point Property, Craig's Property*
- X-90-14 L.A. Chagrova *Undecidable Problems in Correspondence Theory*
- X-90-15 A.S. Troelstra *Lectures on Linear Logic*

