

*Team SIGNES**Linguistic signs, grammar and meaning:
computational logic for natural language**Futurs*

THEME 3A

Activity
Report

2003

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1. Team

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2. Overall Objectives

Joint team with LaBRI (UMR 5800 C.N.R.S.) and the Department of Linguistics of University Michel de Montaigne (Bordeaux 3) (in particular with the Jeune Equipe JE 2385 TELANCO).

This team is addressing several domains of computational linguistics such as:

- derivational morphology
- syntax
- logical (or predicative) semantics
- discourse representation

by means of formal methods such as:

- formal language theory
- categorial grammars
- resource logic

- lambda calculus
- higher order logic

Two applications illustrate this approach:

- natural language tools for Sanskrit
- generation in French Sign Language

We also develop the corresponding computational linguistics tools. Ultimately these tools will result in a significant generic NLP platform encompassing analysis, generation and acquisition devices. Some specific languages will deserve particular attention, like Sanskrit, French Sign Language, French. This platform will also include a meta component handling grammar classes.

3. Scientific Foundations

3.1. The center: natural language syntax and semantics

Key words: *computational linguistics, natural language processing, NLP, formal languages, logic.*

Since the early days of computer science, natural language is both one of its favorite applicative field and the source of technical inspiration, as exemplified by the relation between formal language theory and linguistics. [63]

Nowadays, the motivation is the need to handle lots of digitalized textual and even spoken information, in particular on Internet, but also the interesting mathematical and computational questions raised by computational linguistics, which can lead to other applications.

Most common natural language tools are information retrieval, spell checkers, and in a least proportion, natural language generation, automatic summary, computer aided translation.

Statistical methods and corpus linguistics [58] have been quite successful for the last years, but there is a renewal of symbolic methods, and especially of logical ones, because of the advances in logic, the improvement of computer abilities for those not so fast algorithms, and overall the need for systems which do handle the meaning of phrases, sentences or discourses. [68]

For all these applications, like queries in natural language, refined information retrieval, natural language generation, or computer aided translation, we need to relate the syntax of an utterance to its meaning. This relation, known as the syntax/semantics interface and its automatization, are the center of this project. This notion is in general used for sentences, but we also work on the extension of this correspondence to discourse and dialogue.

The study of the interface between syntax and semantics offers several interests of a different nature:

- As said above, this enables applications for which the meaning ought to be handled.
- From a linguistic viewpoint, this is a major issue, already present in Saussure with the two sides of the linguistic sign, and which is more developed in Chomsky's recent minimalist theory, where a sentence is precisely the articulation point between its Logical Form and its Phonological Form. [40]
- From a mathematical and algorithmic viewpoint, this interface is the place of some challenges: what is the link between two of the main frameworks, namely generative grammars and categorial grammars? The first ones are exemplified by tree Adjoining Grammars [48] or Minimalist Grammars [64]. They enjoy efficient parsing algorithms and a broad covering of syntactic constructs. The second ones (see e.g. [60]) are less efficient but provide more accurate analyses. Indeed these later systems are used for syntax as well as for logical or predicative semantics like Montague semantics [67][45] and thus allows generation algorithms. Other models, like dependency grammars, [70] provide a different account of the syntax/semantics interface. A comparison between the dependency model and a generative/logical one enables an assessment of the adequation of these families of models, and this is a main challenge of contemporary formal linguistics.

At one end of our spectrum stands morphology, and as often in generative grammar, we consider it as part of syntax. It should be nevertheless observed that the computational models involved in the processing of morphology are of different aspects : finite state automata, regular transducers, etc. [51][52]

At the other end, on the semantical side, we do not consider ontological aspects of semantics, or lexical semantics, but rather extend the logical semantics to discourse and dialog. This is usually done by Discourse Representation Theory [50], which is topdown, incremental and involves state changes.

3.2. Word structure and automata: computational morphology

Participants: Gérard Huet, Kim Gerdes.

Key words: *finite state automata, transducers, morphology.*

Computational models for phonology and morphology is a traditional application of finite state technology. [51][52][53][39] These models often combine symbolic or logical systems, like rewriting systems, and statistical methods like probabilistic automata which can be learnt from corpus by hidden Markov models. [58]

Morphology is described by means of regular transducers and regular relations, and lexical data bases, as well as tables of phonological and morphological rules are compiled or interpreted by algebraic operations on automata.

The existing techniques for compiling such machinery are rather confidential, while any naive approach leads to a combinatorial explosion. When transformation rules are local, it is possible to compile them into an invertible transducer directly obtained from the tree which encodes the lexicon.

A generic notion of sharing allows to have compact representation of such automata. Gérard Huet has implemented a toolkit based on this technique, which allows automatical segmentation of a continuous phonologic text.

This study of the linear structure of language and of word structures is by itself sufficient for applications like orthographic correctors and text mining. Furthermore, this preprocessing is required for the analysis of other layers of natural language like syntax, semantics, pragmatics, etc.

3.3. Sentence structure and formal grammars: syntax

Participants: Maxime Amblard, Roberto Bonato, Kim Gerdes, Alain Lecomte, Richard Moot, Christian Retoré.

Key words: *formal grammars, categorial grammars, tree adjoining grammars, dependency grammars.*

While linear structure is in general sufficient for morphological structure, trees are needed to depict phrasal structure, and, in particular, sentence structure. Different families of syntactic models are studied in *Signes*: rewriting systems of the Chomsky hierarchy, including tree grammars, and deductive systems, i.e. categorial grammars.

The former grammars, rewrite systems, have excellent computational properties and quite a good descriptive adequacy. Relevant classes of grammars for natural language syntax, the so-called mildly context sensitive languages, are just a bit beyond context-free languages, and they also enjoy polynomial parsing. [49] Among these classes of grammars let us mention Tree Adjoining Grammars, [47][48], Minimalist Grammars. [64][65][59] — Dependency Grammars share some properties with them but the general paradigm is quite different [71][42].

Edward Stabler introduced Minimalist Grammars as a formalization of the most recent model of the Chomskian or generative tradition and they are quite appealing to us. They propose a uniform model for the syntax of all human languages.

- There are two universal, language independent, rules, called *merge* and *move* : they respectively manage combination of phrases and movement of phrases (or of smaller units, like *heads*).

- Next, a language is defined by a (language dependent) lexicon which provides words with features describing their syntactic behavior: some features trigger *merge* and some others *move*. Indeed, features have positive and negative variants which must cancel each other during the derivation (this is rather close to resource logics and categorial grammars).

Consequently they are able to describe numerous syntactic constructs, providing the analyzed sentences with a fine grained and complete syntactic structure. The richer the syntactic structure is, the easier it is to compute a semantic representation of the sentence.

They also cover phenomena which go beyond syntax, namely they include morphology via flexional categories, and they also incorporate some semantic phenomena like relations between pronouns and their possible antecedents, quantifiers, etc.

A drawback of rewrite systems, including minimalist grammars, is that they do not allow for learning algorithms which could automatically construct or enlarge grammars from structured corpuses. But their main drawback comes from the absence of structure on terminals, which gives no hint about the predicative structure of the sentence.

Indeed, a strong reason for using categorial grammars, [60] despite their poor computational properties, and poor linguistic coverage, is that they provide a correspondence between syntactic analyses and semantic representations. This is to be explained in the next section on the syntax/semantics interface.

In order to improve the computational properties of categorial grammars, and to extend their scope, one can try to connect them to more efficient and wider formalisms, like minimalist grammars. [55][54][62]

3.4. Sentence structure and logic: the syntax/semantics interface

Participants: Houda Anoun, Roberto Bonato, Joan Busquets, Alain Lecomte, Richard Moot, Christian Retoré.

Key words: *categorial grammars, Montague semantics, computational semantics.*

Why does there exist a simple and computable correspondence between syntax and semantics in categorial grammars? This is mainly due to the internal functional structure of non-terminals in categorial grammars, which yields a correspondence with semantic formulae and functions. This correspondence between syntactic and semantic categories extend to terms, or analyses because the usual logic in use for typed lambda-calculus is an extension of the resource logic used for syntactic deductions or analyses. [45][41]

Nevertheless this computational correspondence between syntax and semantics provided by categorial grammars is very limited. Firstly, for the correspondence between syntactic and semantic types to hold, we have to provide words with syntactic types which are *ad hoc*, and even wrong. For instance, why should the type of a determiner depend of the constituent it is involved into? Secondly, the truth-conditional aspect of Montague semantics can be discussed both from a theoretical and from a practical viewpoint. According to cognitive sciences, and even to common sense, it is unlikely that human beings develop any possible interpretations when they process and understand a sentence, and in practice such a construction of all models is definitely untractable. [46] Thirdly, a strict compositional principle does not hold, as the famous Geach examples shows.

In this project we address the first issue, which is a real limit, and the third one, in the next section on discourse. The first point is one of the motivations for studying the syntax/semantics interface for minimalist grammars. Indeed, they are rather close to categorial grammars and resource logic, and using this similarity we are able to extend the correspondence to a much richer grammatical formalism, without having strange syntactic types. [54][62]

3.5. Discourse and dialogue structure: computational semantics and pragmatics

Participants: Agnès Bracke, Joan Busquets, Pierre Castéran, Gérard Huet, Alain Lecomte, Henri Portine.

Key words: *Montague semantics, DRT, computational semantics.*

Montague semantics has some limits. Two of them which, technically speaking, concern the context, can be overcome by using DRT, that is Discourse Representation Theory and its variants. [50][69] Firstly, if one wants to construct the semantics of a piece of text, one has to take into account sequences of sentences, either discourse or dialogue, and to handle the context which is incrementally defined by the text. Secondly, some constructs do not obey the strict compositionality of Montague semantics, since pronouns can refer to bound variables. For instance a pronoun of the main clause can be bound in a conditional sub-clause.

For these reasons, Discourse Representation Theory was introduced. This model defines an incremental view of the construction of discourse semantics. As opposed to Montague semantics, this construction is top-down, and rather proceed like state change than like functional application — although lambda-DRT present DRT in a Montague style, see e.g. [69].

3.6. Type systems and functional programming for computational linguistics

Participants: Houda Anoun, Roberto Bonato, Pierre Castéran, Paul Gloess, Gérard Huet, Yannick Le Nir, Richard Moot.

Key words: *functional programming, proof assistant, logic programming, type theory.*

The team has developed competences in logic, lambda-calculus. These models are commonly used in computational linguistics :

- An example is categorial grammars, with their parsing-as-deduction paradigm, which use proofs in Lambek calculus or linear logic as syntactic trees.
- Another examples is Montague semantics which uses the Church description of higher-order logic, implemented in lambda calculus in order to have the compositionality principle of Frege.
- Finally, Discourse Representation Theory also is logic, in a different syntax, and can be combined with Montague semantics to obtain lambda-DRT.

Consequently it is quite natural to develop tools in programming languages relying on logic and type theory:

- The Grail syntactic and semantic parser for Multi Modal Categorial grammars, defined and implemented by Richard Moot, is written in Prolog. This is the most developed and efficient software for categorial grammars, relying on recent development in linear logic, in particular proof nets. [8]
- Under the supervision of Yannick Le Nir and Christian Retoré, a team of students implemented in OCaml the first steps of a platform for parsing and learning categorial grammars and related formalisms.[37]
- Gérard Huet developed his Zen toolkit for morphology, using finite state technology, in OCaml. He actually obtained excellent performances, thus proving the relevance of *pure* functional programming for computational linguistics. [6]
- Houda Anoun and Pierre Castéran are formalizing in Coq [2] various frameworks for the syntax and semantics of natural language. The nature of Coq broadens the scope of computational linguistic software. Firstly it can be used as a syntactic and semantic parser, as others programming languages do. Secondly, it enables computer aided proofs of some properties *of* the linguistic models; this way, it helps researchers in computational linguistics to prove some meta-properties of the models they use, especially when the objects to handle are logical formulae, proofs and terms. [35] Finally, the rich type system of Coq is wide enough for extensions of semantical models like Montague semantics, DRT etc.

4. Application Domains

4.1. Sanskrit philology

Participant: Gérard Huet.

Key words: *Sanskrit, natural language processing, Indian studies, Internet.*

Sanskrit literature is extremely rich, and is part of cultural patrimony. Nowadays, Internet can provide to both specialists and inquiring minds an access to it, for instance such a site exists for ancient Greek and Latin literature <http://www.perseus.tufts.edu>. This site provides an online access to the texts.

A simple click on each word analyses it, and brings back the lexical item of the dictionary, possible meanings, statistics on its use etc. The work of Gérard Huet described in the software section enables such computational tools for Sanskrit. For the time being, Peter Scharf from Brown University has developed a hand-tagged Sanskrit reader, which allows students to read simple texts differently: firstly in davanagari writing, then word-to-word, then a word-to-word translation, then by sentence-to-sentence translation. The segmentation tools and the forthcoming inversion of flexional morphology will provide a computer aided for segmentation and tagging of continuous Sanskrit texts. A further step will be construction of a tree bank of Sanskrit examples.

This will ultimately lead to a Sanskrit analogous of Perseus.

4.2. Towards French Sign Language (LSF) modelling and processing

Participants: Xavier Lavry, Olivier De Langhe, Pierre Guitteny, Henri Portine, Christian Retoré.

Key words: *sign language, deaf community, disabled, multimedia communication.*

After a hundred year prohibition (1880-1980) Sign Language is the object of new studies and development: a first aspect is social acknowledgment of sign language and of the deaf community, a second aspect is linguistic study of this language with a different modality (visual and gestural as opposed to auditive and phonemic) and the third and most recent aspect which relies on the second, is the need for sign language processing. A first goal is computer aided learning of Sign Language for people and even deaf people without access to sign language, and more challenging objectives would be computer aided translation from or to sign language, or direct communication in sign language.

Given the rarity of linguistic study on the syntax and semantics of sign languages — some exceptions concerning American Sign Language are [61][56][57] — before to be able to apply our methodology, our first task is to determine what the structure of the sentence is, using our personal competence as well as our relation with the deaf community.

We intend to define methods and tools for generation of sign language sentences. It should be noted that there is a sequence of different representations of a sentence in Sign Language, from a grammatical description with agreement features and word/sign order that we are familiar with, to a notation system like Signwriting [66] or to a language for the synthesis of 3D images and movies. Our competences on the interface between syntax and semantics are well designed for a work in generation of the grammatical representations.

A first application would be a software for teaching Sign Language, like the CD ROM *Les Signes de Mano* by IBM and IVT. Indeed, presently, only dictionaries are available on computers, or examples of sign language videos, but no interactive software. Our generation tools, once developed, could be useful to educative purposes.

5. Software

5.1. The Zen toolkit

Participant: Gérard Huet [correspondant].

Key words: *natural language processing, segmentation, computational morphology, finite state technology, functional programming.*

This software has been developed by Gérard Huet for many years, in the Cristal project-team, and it is clearly the most significant software presented in Signes.

It is a generic toolkit extracted by Gérard Huet from his Sanskrit modeling platform allowing the construction of lexicons, the computation of morphological derivatives and flexed forms, and the segmentation analysis of phonetic streams modulo euphony. This little library of finite state automata and transducers, called Zen for its simplicity, was implemented in an applicative kernel of Objective Caml, called Pidgin ML. A *literate programming* style of documentation, using the program annotation tool Ocamlweb of Jean-Christophe Filliâtre, is available. The Zen toolkit is distributed as free software (under the GPL licence) in the Objective Caml Hump site. This development forms a significant symbolic manipulation software package within pure functional programming, which shows the feasibility of developing in the Ocaml system symbolic applications having good time and space performance, within a purely applicative methodology.

A number of uses of this platform outside of the Cristal team are under way. For instance, a lexicon of french flexed forms has been implemented by Nicolas Barth and Sylvain Pogodalla, in the Calligramme project-team at Loria.

The algorithmic principles of the Zen library, based on the linear contexts datastructure ('zipper') and on the sharing functor (associative memory server), were presented as an invited lecture at the symposium Practical Aspects of Declarative Languages (PADL), New Orleans, Jan. 2003 [25]. An extended version was written as a chapter of the book "Thirty Five Years of Automating Mathematics", edited in honor of N. de Bruijn [23].

5.2. Categorical grammars in Coq

Participants: Houda Anoun, Pierre Castéran [correspondant].

Key words: *parsing, categorical grammars, computational semantics, Montague semantics, proof assistant.*

Houda Anoun and Pierre Castéran, our Coq expert [2], have been implementing categorical grammars in Coq. [35]

This development contains a formalization of multimodal categorical grammars, and includes complete proofs of interoperability between axiomatic presentation, natural deduction and sequent calculus for these grammars, as well as a complete proof of completeness and soundness of these calculi using Kripke models. It includes various tactics for syntactic analysis and allows to prove theorems on entire grammar classes. [35]

5.3. Experiments in categorical grammars

Participants: Paul Gloess, Richard Moot, Yannick Le Nir [correspondant], Christian Retoré.

Key words: *parsing, grammatical inference.*

This software is an academic prototype. It is the combination of two *Travaux d'Etude et de Recherche* of 4th year students: Véronique Moriceau et Jérôme Pasquier (Université de Nantes, 2002) which has been reorganized and extended by Thomas Poussevin, Jean-François Deverge, Fahd Haiti, Anthony Herbé (Université Bordeaux 1, 2003). [37] It is written in OCaML, with an interface written in Tcl/Tk and the input and output format are XML files (DAGs for representing analyses, proofs and trees).

Presently, the following algorithms are implemented:

- learning categorical grammar from structured sentences,
- inter-translation in any possible direction between AB categorical grammars, Lambek grammars, context-free grammars in Greibach normal form, context-free grammars in Chomsky normal form,
- parsing of categorical grammars by proof search,
- parsing context-free grammars with the Cocke-Kasami-Younger algorithm.

6. New Results

6.1. Robust syntax

Kim Gerdes has designed, within the dependency grammar paradigm, a notion of tree with syntactic places which allows a neat treatment of relatively free word order with a single underspecified analysis for different variants with respect to allowed word permutation.[20]

G rard Huet has started to model Sanskrit syntax based on the polarity of morphosyntactic features which is both inspired by minimalism and dependency syntax.

6.2. Syntax semantics interface for generative grammars

Still using the coding of [55][54] of minimalist grammars into categorial grammars that we call categorial minimalist grammars Maxime Amblard, Alain Lecomte and Christian Retor  have improved the computation of semantic recipes from these analyses. One idea was to use lambda terms with contexts, as developed in [34] or in [33] or to use a criterion of synchronization between the syntactic and the semantic derivation which are thus acting on a par [31][17][28].

A related question, studied by Joan Busquets, is to study subtle differences between different kind of verbal ellipsis. For instance why can we say *I am happy. She is too.* and not *Je suis content. * Elle est aussi. ?* A distinction between VP ellipsis and IP ellipsis (known as stripping) , studied through Catalan which stresses this difference, allows us to determine what can be erased and when, e.g. for generation purposes.

6.3. Discourse and dialogue

The latest point of previous section on the syntax/semantics interface is also related to discourse, but to syntax as well. Under the supervision of Joan Busquets and Henri Portine, Emilie Voisin during her student internship on dialog proposed a model of belief revision inspired by functional programming, using sets of weighted formulae which have to be maximized. [38]

Alain Lecomte and Aseski Nait-Abdallah (Universit  de Brest) have also explored belief revision during dialog, based on partial information. Indeed partial information is well designed for studying presupposition since presupposition cannot have a normal truth value: they are subject to revision. So they defined a partial information model for reasoning with implicit propositions.[30]

6.4. Learning categorial grammars

Participants: Roberto Bonato, Yannick Le Nir.

Yannick Le Nir established with Annie Foret (IRISA, Rennes) that various classes of categorial grammars are not learnable from strings of words, for instance Lambek grammars. [43][44]

He also established the existence of a normal form for analyses in Lambek grammars, and in non associative Lambek grammars.[15] In the later case, this entails that non-associative Lambek grammars are learnable from strings. [13]

6.5. Monography on Coq

Together with Yves Bertot (Lemme project-team), Pierre Cast ran achieved (December 2003) the first book on the Coq proof assistant. [2] This book uses the forthcoming 8.0 release, which represents dramatic changes (syntax, libraries, tactics). The revision of the book, testing of the new features, and dialogue with the Local project-team took place in the 6 last months.

6.6. Sanskrit

G rard Huet presented an original algorithm of segmentation and tagging for the Sanskrit language at the XIIth World Sanskrit Conference, Helsinki, Finland, Aug. 2003 [22]. The problem of proper treatment of preverbs,

which gave rise to a specific prediction technique ('phantom phonemes'), was presented at the International Conference on Natural Language Processing (ICON-2003) at Mysore, India, in December 2003. [24]

The Web site <http://pauillac.inria.fr/~huet/SKT>, which presents various Sanskrit linguistics resources interactively, has an average of 1500 monthly visitors. In September 2003, a database of 200 000 flexed forms was delivered as a free resource in the XML format (given with a specific DTD). This database is used for research experiments by the team of Pr. Stuart Shieber, at Harvard University.

A collaboration is under way with Pr. Peter Scharf, from the Classics Department at Brown University, for interoperable use of such resources and exchange of annotated corpuses. An intern from the International Information Institute of Technology (IIIT) in Hyderabad spent his two months of summer internship in Rocquencourt to realise a module for manipulating within Ocaml an XML database conforming to a DTD. This was used notably to adapt to Ocaml the Whitney Dictionary of Roots, which was digitalised as an XML document by collaborators of P. Scharf. This work is a preliminary step in the systematic construction of the conjugated forms of Sanskrit verbs.

Another collaboration was started in September with Pr. Brendan Gillon, a linguist from Mc Gill University in Montreal, on the software structuring of a tree bank he manually constructed from an annotated corpus of 500 sentences, issued from citations chosen in the Apte course book on Sanskrit syntax. This work ought to lead to the first version of a formal grammar describing Sanskrit sentences.

6.7. Modeling French sign language (LSF) grammar

Olivier De Langhe, Pierre Guitteny, Henri Portine and Christian Retoré have been addressing the question of neutral word order in simple sentences expressed in french sign language (LSF). After an empirist study, they discovered that *Object Subject Verb* is a rather frequent order in LSF, especially when the *Objet* is unanimated and the *Subject* is human. This conflicts with existing linguistic theories which claim that *OSV* does not exist, or, rather is the result of a topicalization which emphasizes the *Object*. Nevertheless in their observations, in some sentences there is no other possibility, or at least the *OSV* order is strongly preferred. Their observation and analysis of basic sentences in french sign language has been presented at the *Journées d'études internationales – La linguistique de Langue des Signes Française : recherches actuelles* in Lille. [18]

In parallel they are looking how to organize the processing of LSF, in particular for generation of LSF sentences from semantic recipes. Firstly they are studying how to represent sign language sentences as feature structures and the relation between these feature structures and a notation system for sign language, namely SignWriting. [66] This program has been presented by the participants at the *Workshop on Minority Languages* held at *Traitement Automatique du Langage Naturel 2004* at Batz-sur-Mer. [19]

A related question is the study of French grammar in French Sign Language. Indeed the verbal/nominal distinction and the choice of the categories appear in this more education oriented research. [36]

7. Contracts and Grants with Industry

7.1. IBM

IBM and the Université Bordeaux 1 have signed an agreement for the integration of disabled students, and funds have been given to the university by the company. Provided some agreement is found Olivier De Langhe, who is deaf, can benefit from some of the opportunities, like translator for seminars, laptop with Viavoice and subtitle facilities, etc.

7.2. SONY

There are some ongoing relations between SONY and ENSEIRB. In October 2003 Paul Gloess was invited in Japan to present the LABRI and in particular the *Signes* project team to SONY.

8. Other Grants and Activities

8.1. National research programs

8.1.1. *Groupe de Recherche C.N.R.S. 2521 Sémantique et modélisation*

Signes is one of the fifteen research team of the Groupe de Recherches 2521 (C.N.R.S.) directed by Francis Corblin (Université Paris IV). This research program is divided into *Opérations: Modèles et formats de représentation pour la sémantique*, *Les Modèles à l'épreuve des données*, *Sémantique et corpus*, *Les interfaces de la sémantique linguistique*, *Sémantique computationnelle*. The *Signes* team is part of the later two operations, which could be translated as *Interfaces of linguistic semantics* and *Computational semantics*.

8.2. European research programs

8.2.1. *CoLogNet: European network of Excellence on Computational logic*

The team *Signes* is an active node of this network and, in particular of the section 6 of this network: computational logic for natural language processing, headed by Michael Moortgat. The contact person is Gérard Huet.

8.2.2. *UIL-OTS Utrecht Signes (Action intégrée van Gogh)*

A research program entitled *Generative grammar and deductive systems for the processing of natural language syntax and semantics* has been approved for 2004. The other team in this bilateral research program is *Computational linguistics and logic* directed by Michael Moortgat at *Utrecht Institute of Linguistics*. The dutch contact is Willemijn Vermaat, and the french one is Christian Retoré.

9. Dissemination

9.1. Activism within the scientific community

9.1.1. *Honours*

- Gérard Huet is member of the *Académie des sciences* since November 2002.

9.1.2. *Editorial boards*

- Alain Lecomte and Christian Retoré are on the editorial board of the journal *TAL – Traitement Automatique des Langues*, Editions Hermès, Paris since august 2001.
- Alain Lecomte and Christian Retoré are on the editorial board of the book series *Research in Logic and Formal Linguistics*, Edizione Bulzoni, Roma, since 1999.
- Henri Portine is on the editorial board of the journal *ALSIC – Apprentissage des Langues et Systèmes d'Information et de Communication*
- Christian Retoré is reviewer for *Mathematical Reviews* since october 2003.

9.1.3. *Program committees of conferences*

- Roberto Bonato was on the program committee of the student session of ESSLLI 2003 (Vienna).
- Roberto Bonato was on the program committee of the student session of ACL 2003 (Bucarest).
- Alain Lecomte et Christian Retoré were on the program committee of the 8th conference *Mathematics of Language*, Bloomington, june 2003.
- Christian Retoré was *area chair* of the student session on *logic and language* of ESSLLI 2003 (Vienna).

9.1.4. Academic committees

- Joan Busquets is a member of the hiring committees in linguistics of Université Toulouse 2 and Université Bordeaux 3
- Paul Gloess is in charge of the international relations of ENSEIRB.
- Paul Gloess is in charge of the industrial relations of ENSEIRB.
- Gérard Huet is the president of the hiring committee of INRIA-Futurs.
- Gérard Huet is a nominated scientific personality of the board of governors of the Université Paris 7.
- Gérard Huet is the president of the evaluation committee of the CNRS team *Preuves, programmes, systèmes*.
- Henri Portine is a member of the hiring committees in linguistics of Université Paris 3 and Université Bordeaux 3.
- Henri Portine is an elected member of the board of governors of the Université Bordeaux 3 and of Institut Universitaire de Formation des Maîtres d'Aquitaine.
- Henri Portine is the head of the linguistic department of Université Bordeaux 3.
- Henri Portine is the head of the research team *Text, Language, Cognition* JE2385.
- Christian Retoré was a member of the hiring committee in computer-science of Université Bordeaux 1 until september 2003.

9.1.5. Organization of events

- Josy Baron, Gérard Huet, Yannick Le Nir, Christian Retoré organized the last meeting of the INRIA New Investigation Grant on *Categorial Grammar Acquisition* in march 2003.
- Yannick Le Nir organized the weekly seminar *Linguistique et informatique* Universités Bordeaux 1 et 3.

9.2. Teaching

Since all its members are university staff, *Signes* is intensively implied in teaching, both in the computer science cursus of the science University (Bordeaux I) and in the linguistic cursus of the letter University (Bordeaux III). Let us cite the lectures whose topic is computational linguistics:

- *Symbolic natural language processing* 5th year in computer science (Gérard Huet, Christian Retoré)
- *Utterance acts and semantics* 5th year in linguistics (Henri Portine)
- *Pragmatics* 4th year in linguistics (Joan Busquets)
- *Advanced programming* 4th year in computer science (Pierre Castéran)
- *Discourse and dialogue analysis* 3th year in linguistics (Joan Busquets)
- *Formal syntax* 3th year in linguistics (Henri Portine and Christian Retoré)

9.3. Thesis Juries

- Pierre Castéran was on the PhD committee of Nicolas Magaux *Changements de représentation des données dans le calcul des constructions*, October 21th 2003, Université de Nice-Sophia Antipolis (examiner)
- Gérard Huet was on the PhD committee of Virgile Prevosto *Conception et implantation d'un environnement de programmation certifié pour le calcul formel*, Université Paris 6, September 15th 2003. (examiner)
- Gérard Huet was on the Habilitation committee of Guy Perrier *Grammaires d'interaction*, Université Nancy 1, November 12th 2003. (reviewer)
- Alain Lecomte was on the PhD committee of Jeanne Villaneau *Contribution au traitement syntaxico-pragmatique de la langue naturelle parlée : approche logique pour la compréhension de la parole* Université de Bretagne Sud, December 4th 2003 (reviewer).
- Henri Portine was on the PhD committee of Sonia Berbinschi, *L'antonymie discursive*, université Bordeaux 3, June 28th 2003 (co-advisor).
- Henri Portine was on the PhD committee of Dominique Verbeken, *Etude de la temporalité dans Jacques le Fataliste*, université Bordeaux 3, Novembre 10th 2003 (advisor).
- Henri Portine was on the PhD committee of Gilles Schlosser, *La mise en relief en espagnol*, université Bordeaux 3, December 1st 2003. (president)
- Henri Portine was on the PhD committee of Catherine Guesle-Coquelet *Les termes d'adresse en français*, université Bordeaux 3, December 11th 2003. (president)
- Christian Retoré was on the PhD committee of Christophe Costa-Florêncio, *Learning categorial grammars* Universiteit van Utrecht, November 14th 2003 (reviewer)
- Christian Retoré was on the PhD committee of Yannick Le Nir, *Structure des analyses catégorielles – application à l'inférence grammaticale*, Université de Rennes, December 15th 2003 (advisor)

9.4. Academic supervision

9.4.1. Student intern supervision – fourth and fifth year

- Joan Busquets and Henri Portine supervised the work of Emilie Voisin *Dialogue, planification, logique*, Université Bordeaux 3, June 2003. [38]
- Pierre Castéran supervised the master thesis of Houda Anoun *Réalisation d'un atelier logique sur le calcul de Lambek*, Université Bordeaux 1, June 2003. [35]
- Alain Lecomte and Christian Retoré supervised the master thesis Maxime Amblard *Extraction de représentations sémantiques dans les grammaires minimalistes*, Université Bordeaux 1, June 2003. [34]
- Henri Portine supervised the master thesis of Pierre Guitteny *L'enseignement de la grammaire du français en langue des signes*, Université Bordeaux 3, June 2003. [36]
- Christian Retoré supervised the master thesis of Thomas Poussevin, Jean-François Deverge, Fahd Haiti, Anthony Herbé *Traitement automatique des langues : Analyse syntaxique pour les grammaires catégorielles.*, Université Bordeaux 1, May 2003. [37]

9.4.2. PhD supervision

- Joan Busquets and Andrée Borillo (Université Toulouse 2) are co-supervising the thesis work of Laurent Prévot *Une approche sémantique et pragmatique du dialogue – le rôle des topiques dans les explications d'itinéraire*. (Université Toulouse 2)
- Pierre Castéran and Christian Retoré are co-supervising the thesis work of Houda Anoun *Formalisation des grammaires minimalistes dans le calcul des constructions inductives*. (Université Bordeaux 1)
- Alain Lecomte and Christian Retoré are co-supervising the thesis work of Maxime Amblard *Calcul de représentations sémantiques dans les grammaires minimalistes*. (Université Bordeaux 1)
- Henri Portine and Mariana Tutescu (Universitatea din Bucuresti) have been supervising the thesis work of Sonia Berbinschi *L'antonymie discursive*. (Université Bordeaux 3 / Universitatea din Bucuresti) defense: June 2003.
- Henri Portine is supervising the thesis work of Yoann Debuys *La métaphore: approches linguistique et cognitive*. (Université Lille 3)
- Henri Portine is supervising the thesis work of Pierre Guitteny *Le passif en Langue des Signes Française*. (Université Bordeaux 3)
- Henri Portine is supervising the thesis work of Xavier Lavry *La consitution d'un environnement hypermédia en didactique des langues*. (Université Bordeaux 3)
- Christian Retoré and Alexandre Dikovsky (Université de Nantes) are co-supervising the thesis work of Erwan Moreau *Acquisition de grammaires catégorielles et de grammaires de dépendances*. (Université de Nantes)
- Christian Retoré and Annie Foret (Université Rennes 1) have been co-supervising the thesis work of Yannick Le Nir *Structure des analyses syntaxiques catégorielles — application à l'inférence grammaticale*. defense: December 2003.
- Christian Retoré and Denis Delfitto (Università di Verona) are co-supervising the thesis work of Roberto Bonato *Algorithmes de calcul de représentations sémantiques à partir d'analyses de type générativiste et algorithmes inverses*. (cotutored PhD Université Bordeaux 1 / Università di Verona)

9.4.3. PhD defense

- Yannick Le Nir defended his PhD *Structure des analyses syntaxique catégorielles — application à l'inférence grammaticale* at the Université de Rennes 1 on december, 15th 2003 [13]

9.5. Participation to colloquia, seminars, invitations

9.5.1. Visiting scientists

The weekly seminar *Linguistique et informatique* organized by Yannick Le Nir received the visit of several scientists:

- Erwan Moreau (Université de Nantes) *Généralisation de l'algorithme RG*
- Bill Rounds (University of Michigan and Cambridge University) *Feature logic for computational linguistics*
- Claire Gardent (CNRS, LORIA, Nancy) *La construction sémantique dans les grammaires d'arbres adjoints*
- Patrice Dalle (Université Toulouse 3) *Traitement Informatique de la Langue des Signes Française*
- Michael Moortgat (Universiteit Utrecht) *Pregroups and Type Logical Grammars*

- Claire Beyssade (CNRS, Institut Jean Nicod, Paris) *Construction existentielles et typage sémantique*
- Marie-Claude Paris (Université Paris 7) *Quelques aspects du chinois contemporain*
- Jenny Benois-Pineau (Université Bordeaux 1) *Analyse vidéo dans l'objectif de la détection de mouvements naturels*
- Pascal Amsili (Université Paris 7) *Sémantique formelle et compositionnelle du langage naturel: quelques problèmes en lambda-DRT*
- Nissim Francez (Technion, Haifa) *Categorial grammars and semantics for indexical preposition phrases*
- Ora Matushansky (CNRS, UMR 7023, Paris) *The semantics of nominal predicate marking in French and Russian*
- Willemijn Vermaat (OTS, Utrecht) *Up want to call — a formalization of verb cluster with particle*
- Véronique Moriceau et Patrick Saint-Dizier (CNRS, IRIT, Toulouse) *Sémantique lexicale, polysémie et métaphores*
- Sylvain Pogodalla (INRIA, LORIA, Nancy) *Grammaires catégorielles abstraites et hiérarchie de langages*

Signes organized last meeting of the INRIA New Investigation Grant GRACQ on Categorial grammar Acquisition on March 17th -18th 2003. We had the following visitors: J. Besombes, Ph. de Groote, F. Lamarche, J.-Y. Marion, G. Perrier, S. Pogodalla, S. Salvati (INRIA Project Team Calligramme, Nancy), D. Bechet, A. Foret (IRISA, Rennes), I. Tellier, D. Dudau, A. Lemay M. Tommasi (Grappa, Université Lille 3), A. Dikovsky (Université de Nantes).

9.5.2. Talks at local seminar

Most of the *Signes* members presented their work to the weekly seminar *Linguistique et Informatique* organized by Yannick Le Nir : Maxime Amblard, Houda Anoun, Roberto Bonato, Joan Busquets, Alain Lecomte, Yannick Le Nir, Richard Moot, Henri Portine, Christian Retoré.

- Gérard Huet gave a talk at the *Graphes et Logique* seminar on *Automates mixtes*.
- Richard Moot and Christian Retoré gave a talk at the LaBRI main seminar *Méthodes formelles en linguistique informatique*
- Christian Retoré gave a talk at the *Graphes et Logique* seminar on *Graphes de démonstration*.
- Christian Retoré gave a talk *Linguistique et informatique* in *Les rendez-vous du lundi* organized by the culture department of Université Bordeaux 1.

9.5.3. Seminar talks, invitations

- Joan Busquets gave a talk at the seminar of computational linguistics de l'Universitat Pompeu Fabra (Barcelona) on *Focus i ellipsis en català*.
- Joan Busquets gave a talk at the seminar of the *Equipe de Recherche en Syntaxe et Sémantique* (Toulouse) on *Stripping et ellipse*.
- Paul Gloess was invited in Japan to present the *Signes* project-team to SONY in October 2003.
- Henri Portine gave a talk entitled *La grammaire: entre accuracy et fluency* at the linguistic seminar of Université Paris 4.
- Christian Retoré gave a talk entitled *De la structure syntaxique à la structure prédicative d'une phrase*, at the IRISA 68NQRT seminar, Rennes, June 2003.

9.5.4. Summer school lectures

- Christian Retoré and Philippe de Groote (INRIA, LORIA, Nancy) gave a fifteen hour lecture at the *European Summer School in Logic, Language and Information*, Wien, August 2003.
- Christian Retoré gave a six hour tutorial at the *Ecole d'Automne de Linguistique, EALing*, Ecole Normale Supérieure, Paris, October 2003.

9.5.5. Colloquium talks

- Maxime Amblard gave a talk at the workshop *Prospects and advances in the syntax/semantics interface on Syntax and semantics interacting in a minimalist theory*, Nancy, october 2003 (joint work with A. Lecomte and C. Retoré) [17]
- Pierre Guitteny and Henri Portine gave a talk at the workshop *Journées d'études internationales – La linguistique de la Langue des Signes Française : recherches actuelles* entitled *A propos des structures OSV en Langue des Signes française*, Lille, September 2003. (joint work with O. De Langhe and C. Retoré) [18]
- Gérard Huet gave an invited lecture *Practical Aspects of Declarative Languages (PADL) symposium* entitled *Zen and the Art of Symbolic Computing: Light and Fast Applicative Algorithms for Computational Linguistics* [25]
- Gérard Huet gave a talk entitled *Automata Mista* at the *Festschrift in Honor of Zohar Manna for his 64th anniversary*, Taormina, July 2003. [21]
- Gérard Huet gave a talk entitled *Lexicon-directed Segmentation and Tagging of Sanskrit* at the *XIIth World Sanskrit Conference*, Helsinki, July 2003. [22]
- Gérard Huet gave a talk at the *International Conference On Natural Language Processing* entitled *Towards Computational Processing of Sanskrit*, Misore, December 2003 [24]
- Xavier Lavry gave a talk at the at the conference *EUROCALL 2003 - New Literacies in Language Learning and Teaching* entitled *Towards an analysis of the influence of information technology and learner interaction in language learning*, Dublin, 2003. [27]
- Alain Lecomte gave a talk at the *Journées sémantique et modélisation*, on *Sémantique dans les grammaires minimalistes*, Paris, April 2003. (joint work with C. Retoré) [31]
- Alain lecomte gave an invited lecture *Y a-t-il une logique de la classification ?* at the national conference *L'organisation des connaissances : approches conceptuelles (4e congrès ISKO-France)*, Grenoble, July 2003.
- Alain Lecomte gave an invited lecture at the *Journées Nationales sur les Modèles de Raisonnement* entitled *Un modèle de raisonnement avec propositions implicites*, Paris, November 2003. (joint work with Areski Nait-Abdallah) [30]
- Alain Lecomte gave a talk at the *International Conference On Natural Language Processing* entitled *A computational approach to minimalism*, Misore, December 2003 [28]
- Henri Portine gave an invited lecture at the annual meeting of the *Association for French Language Study*, on *La subordination relative en français et en anglais*, Tours, September 2003. [32]
- Christian Retoré gave a talk at the workshop *Minority Languages on Vers un traitement informatique de la syntaxe et de la sémantique de la langue des signes française* Batz-sur-mer, June 2003. (joint paper with O. De Langhe, P. Guitteny and H. Portine) [19]
- Christian Retoré gave an invited lecture at the 3rd international conference on *Algebraic methods in Language Processing*, Verona, August 2003. [33]

9.5.6. Participation to scientific events

- Maxime Amblard, Roberto Bonato, Agnès Bracke, Kim Gerdes, Paul Gloess, Henri Portine, Christian Retoré are following the lectures on french sign language (LSF) given by Olivier De Langhe.
- Alain Lecomte is following a lecture on french sign language (LSF) in Grenoble.
- Pierre Castéran attended the *Journées Francophones des Langages Applicatifs*, nearby Grenoble in January 2003.
- Agnès Bracke, Pierre Castéran, Gérard Huet, Alain Lecomte, Christian Retoré attended the *Ecole d'Automne de Linguistique*, Ecole Normale Supérieure, Paris, October 2003.

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- [2] Y. BERTOT, P. CASTÉRAN. *Interactive theorem proving and program development: COQ art*. series EATCS, Springer Verlag, 2004, <http://www-sop.inria.fr/lemme/Yves.Bertot/coqart.html>, To appear.
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- [6] G. HUET. *Transducers as lexicon morphisms, phonemic segmentation by euphony analysis, application to a sanskrit tagger*. in « Journal of Functional Programming », 2004, <http://pauillac.inria.fr/~huet/PUBLIC/tagger.ps>.
- [7] A. LECOMTE. *Rebuilding the Minimalist Program on a logical ground*. in « Journal of Research on Language and Computation », number 1, 2004, pages 27–55.
- [8] R. MOOT. *Proof nets for linguistic analysis*. Ph. D. Thesis, UIL-OTS, Universiteit Utrecht, 2002.
- [9] H. PORTINE. *La syntaxe de Damourette et Pichon comme outil de représentation du sens*. in « Modèles linguistiques », number 2, volume 23, 2002, pages 21–46.
- [10] H. PORTINE, A. ROUSSEAU. *Tesnière et la syntaxe structurale*. in « Modèles linguistiques », number 2, volume 23, 2002, pages 99–121.
- [11] C. RETORÉ. *Logique linéaire et syntaxe des langues*. Mémoire d'habilitation à diriger des recherches, Université de Nantes, Janvier, 2002.

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- [13] Y. LE NIR. *Structure des analyses syntaxiques catégorielles – application à l’inférence grammaticale*. Thèse de doctorat, Université Rennes 1, décembre, 2003.

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- [14] X. LAVRY. *Du journal papier au cyber-journal en pédagogie du projet avec des primo-arrivants : rupture ou complémentarité ?*. in « Apprentissages des Langues et Systèmes d’Information et de Communication », number 1, volume 6, Juillet, 2003.
- [15] Y. L. NIR. *From Proof Trees in Lambek Calculus to Ajdukiewicz Bar-Hillel Elimination Binary Trees*. in « Journal of Research on Language and Computation », volume 1:3-4, 2003, pages 181–201.
- [16] C. RETORÉ. *Handsome proof-nets: perfect matchings and cographs*. in « Theoretical Computer Science », number 3, volume 294, 2003, pages 473–488, <http://www.inria.fr/rrrt/rr-3652.html>, Complete version RR-3652.

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- [18] O. DE LANGHE, P. GUITTENY, H. PORTINE, C. RETORÉ. *A propos des structures OSV en Langue des Signes Française*. in « Journées d’études internationales – La linguistique de la LSF: recherches actuelles », SILEX-C.N.R.S., A.-M. BERTHONNEAU, G. DAL, editors, 2003, À Paraître.
- [19] O. DE LANGHE, P. GUITTENY, H. PORTINE, C. RETORÉ. *Vers un traitement informatique de la syntaxe et de la sémantique de la langue des signes française*. in « Workshop on Minority Languages – TALN 2003 », ATALA, Batz-sur-mer, 2003.
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- [26] X. LAVRY. *Collaboration entre locuteurs natifs et exolingues et projet pédagogique multimédia*. in « Vèmes Journées de l'Innovation : Travail coopératif, Espaces collaboratifs », Foix, Janvier, 2003.
- [27] X. LAVRY. *Towards an analysis of the influence of information technology and learner interaction in language learning*. in « EUROCALL 2003 - New Literacies in Language Learning and Teaching », Limerick, 2003.
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Miscellaneous

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