

## Major Collaborative Research On Interface Asymmetries

The major fundamental challenge of this research is to develop a model of the contact points (or interfaces) between the language faculty and the other faculties of the cognitive system. Besides from this great intellectual venture, there is also the one of developing information technologies that integrate the cognitive interfaces model. The fundamental task is an answer to the necessity of advancing our knowledge of the language faculty and of its interaction with the other sub-systems of cognition. The technological task is an answer to the necessity of developing parsing systems that are able to handle information most effectively on an electronic platform and thus be more useful to the society at large and more specifically to the users that are affected by language disorders.

The essential questions tackled within this research are the following: which are the properties of interfaces that ensure the communication between the language faculty and the other sub-systems of cognition? How does the semantic and the phonetic processing of linguistic expressions take place? Which are the psycho and neurolinguistic evidences capable of justifying the cognitive treatment of the interfaces asymmetries? (By asymmetry we mean here irreversible relations between two elements of the same set.) How can these be eventually used to improve the automatic systems of language processing?

The theoretical hypotheses will be tested on the basis of empirical data gathered from a wide variety of languages, including Romance, Germanic, Hellenic, Slavic, Asiatic and Algonquian languages. Psycho and neurolinguistic tests will be performed on normal and subjects suffering from cerebral lesions in order to test the cognitive validity of the theoretical hypotheses. These hypotheses will take the form of algorithms and be incorporated into language processing systems. These systems will have the advantage of being based on the properties of human cognition and will thus be performing better than the ones based on probability calculi. The interaction of these works will yield innovative results and the integration of the research activities and the results will allow the development of prototypes for language processing. Via industry partnerships, these prototypes will eventually make way for the development of information retrieval and extraction systems and of software adapted to certain language disorders.

This research has an important impact for the research community as well as for the society at large. Showing that asymmetrical relations play a central role to the interfaces between grammar and the human cognitive system will constitute a breakthrough in human sciences. It will be possible to determine what is it that allows the expressions derived by grammar to be optimally interpreted by the external systems. Moreover, if it turns out that the asymmetrical relations are also privileged by the other cognitive faculties, it will be possible to explain how communication is possible between the cognitive sub-systems, which generate, for example, speech and movement. The practical benefits of our project include the development of more sophisticated data-processing applications capable of simulating human cognitive capacities, as well as the elaboration of linguistic processing tools adapted to the treatment of certain speech disorders. The benefits of this project are thus important in the fields of cognitive science, linguistic engineering and health.

A complete and systematic approach of the interfaces issue requires advances in several connected fields: theoretical linguistics, computational linguistics, psycho and neurolinguistics. To this end, this major work gathers an international network of 40 researchers which are renowned in their respective fields. In Canada, the network includes researchers in Université du Québec à

Montréal, Concordia University, Université Laval, University of Toronto, Queens University, Simon Fraser University, University of Victoria and University of British-Columbia. In The United States, the collaborators are affiliated with prestigious universities, among which Massachusetts Institute of Technology, Princeton University, New York University and University of Massachusetts. Finally, other internationally known collaborators come from universities from Europe (among which are the universities of Venice, Barcelona, Lisbon, Picardie à Amiens, Paris), Asia (Iwate Prefectural University) and Africa (University of Rabat).