

THE CENTRE FOR LOGIC IN CAMPINAS
AND THE DEVELOPMENT OF LOGIC IN BRAZIL

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1. *A Historical Roundup of Mathematical Logic in Brazil*

The first book written in Brazil with some detailed references to Mathematical Logic was Amoroso Costa's *As Idéias Fundamentais da Matemática* (*The Fundamental Ideas of Mathematics*) published in 1929. The first work dedicated to the subject came only in 1940: *Elementos de Lógica Matemática* (*Elements of Mathematical Logic*) by Vicente Ferreira da Silva. That was two years before the arrival of the American logician W.V.O. Quine to Brazil as a visiting professor at the Sociology and Political School in São Paulo. Quine's visit contributed significantly to increase the interest in Logic among Brazilians, and this resulted in the publication of his book, *O Sentido da Nova Lógica*, in 1944.

As the years went by, the interest in the subject picked up. In this regard, Prof. Mário Tourasse Teixeira, from Rio Claro, SP, should be credited with providing the right conditions for research. Having been guided by A. Monteiro, in Bahía Blanca, Argentina, at the time a leading Logic research nucleus in Latin America, Tourasse pointed the way to many people, influencing some of them to dedicate themselves to the subject.

By that time, in the early 1960's, several elementary Logic books were published by Prof. Leônidas Hegenberg, from the Aeronautics Technological Institute (ITA) in São José dos Campos, SP. Hegenberg gave a decisive contribution to the popularization of the subject due to his intensive activity not only as a professor but also as a lecturer, a translator, and article penman.

One should also mention the role played by Prof. Jorge Barbosa, of the Fluminense Federal University, RJ, who formed a small group of researchers in that university, and also held some meetings, mostly in the 1960-62 period.

However, it was in Curitiba, PR, that original Logic research in Brazil came into being, with the works of Prof. Newton C.A. da Costa. There, under the guidance of this professor, Logic workshops were held since 1957, attracting many people, including Prof. Ayda I. Arruda. At these occasions, a small group of Logic fans started interacting. This opened the way to

research, which may be dated back to December 1963, when for the first time a Brazilian Logic research article was published in an important specialized international magazine. The work, *Calculs propositionnels pour les systèmes formels inconsistants*, was published in the magazine of the French Academy of Sciences, *Comptes Rendus*.

The next year (1964), M. Guillaume, from the Clermont-Ferrand University, France, spent three months as a visiting professor in Curitiba, a fact that naturally sparked an even greater interest in research. Arruda, at the time in the Paraná Federal University, published her first works in collaboration with da Costa (1964).

In 1968, da Costa moved to São Paulo. He then formed a group of logicians at the University of São Paulo (USP) and the State University of Campinas (UNICAMP), and has directed from that time on a number of research works.

Mathematical Logic in Latin America was not developed exclusively in Brazil. Other countries, such as Chile and Argentina, were also witnessing a notable flourishing in the area, and the main centre, as already mentioned, was the University of Bahía Blanca, Argentina. Due to this flourishing, by 1964 it was proposed that Latin America should host symposia under the aegis of the Association for Symbolic Logic (A.S.L.), an idea encouraged by the valuable experience garnered at European symposia. Nevertheless, the first concrete step in this sense was taken by A. Robinson in 1968, during his tenure as A.S.L. chairman. In that year, Robinson suggested to Rolando Chuaqui, professor at the Catholic University of Chile, then a visiting professor at the University of California, that the first Latin American symposium be held in the Andean country. The suggestion was accepted, but the event only took place in July 1970, when the First Latin American Symposium on Mathematical Logic (I SLALM) was held at the Catholic University of Chile, in Santiago. Many of the lecturers and speakers came from Brazil, an indication of the good level of research in our country.

The next symposium took place in Brazil, at the University of Brasília, in July 1972. As a preparation for the event, a pre-symposium occurred, intended especially for Brazilian students, at the Aeronautics Technological Institute, in São José dos Campos, SP.

The Brasília symposium was attended by high level lecturers, such as R. Chuaqui (Chile), R. Cignoli (Argentina), M. Dickmann (France), M. Guillaume (France), L. Monteiro (Argentina), A. Robinson (U.S.A.), A. I. Arruda (Brazil), N.C.A. da Costa (Brazil) and P. Suppes (U.S.A.). There were also several Brazilian participants, many of which were students interested in the introductory courses of Logic given during the symposium.

At the occasion, it was decided that the 3rd Latin American Symposium on Mathematical Logic would be held at the University of Bahía Blanca,

Argentina, in July 1974. However, due to the harsh domestic situation in that country, the proposal did not materialize.

The interest in holding the symposium was revived in March 1975. Following a four-month visit to Chile, Prof. Alfred Tarski visited the State University of Campinas, SP, during the first half of March, together with R. Chuaqui. Taking advantage of Tarski's visit, a limited symposium on Mathematical Logic was held on March 3-5, organized by A.I. Arruda, at UNICAMP's Mathematics, Statistics and Computer Sciences Institute (IMECC). The symposium drew in the visitors mentioned above and Brazilian logicians from UNICAMP, USP and the Federal Pernambuco University. Its proceedings were published by IMECC.

Due to the success attained by this symposium and the growing number of Brazilian logicians, it was decided that the 3rd Latin American Symposium on Mathematical Logic would take place at UNICAMP in July 1976. The Association for Symbolic Logic concurred in sponsoring the event through its chairman, J. R. Shoenfield, and appointed the third Consulting Committee for Latin America, consisting of Rolando Chuaqui (Chile) as chairman, Newton C.A. da Costa (Brazil) and Francisco Miró Quesada (Peru). The inclusion of a Peruvian member indicated the participation of a new group, coming from several Peruvian universities located in Lima, together with the already traditional groups of Brazilians, Chileans and Argentineans.

The III Latin American Symposium on Mathematical Logic was divided into three sections: Model Theory, Non-Classical Logics and Computability, and lasted a week (July 11-17, 1976). A whole semester of Logic courses and seminars was previously held as a preparation for post-graduation students.

The success achieved by the symposium was quite extraordinary, and many Brazilian researchers presented communications. Another important point was the presence, among guests and lecturers, of several important foreign logicians, including: F.G. Asenjo (U.S.A.), M. Benda (U.S.A.), R. Chuaqui (Chile), R. Fraïssé (France), J. Kotas (Poland), M. Krasner (France), E.G.K. López-Escobar (U.S.A.), C. Pinter (U.S.A.), R. Routley (Australia), J. R. Shoenfield (U.S.A.) and R. Solovay (U.S.A.).

For the first time, the complete proceedings of a Latin American Symposium on Mathematical Logic were published. The book was published by North-Holland, in its leading series *Studies in Logic and the Foundations of Mathematics* (Arruda, da Costa and Chuaqui, eds., 1977).

The following symposium occurred in December 1978, again in Santiago. As a preparation for the event, a whole year was dedicated to Logic at the Catholic University of Chile. Advanced courses and seminars were given by a number of specialists, including Brazil's N.C.A. da Costa and A.I. Arruda.

Immediately preceding the symposium, a two-week seminar, constituted by short courses on advanced Logic topics, was given by the following specialists: A.I. Arruda (Brazil), N.C.A. da Costa (Brazil), J. Bosch (Argentina), L.F. Cabrera (Chile), U. Felgner (West Germany) and J. Malitz (U.S.A.).

The symposium itself took place on December 18-22, and attracted many foreign guest speakers, including, besides the participants in the seminar: M. Benda (U.S.A.), X. Caicedo (Colombia), E.G.K. López-Escobar (U.S.A.), J.R. Lucas (England), C. Pinter (U.S.A.), W. Reinhardt (U.S.A.) and R. Vaught (U.S.A.).

From Brazil, the following professors lectured: A.I. Arruda, N.C.A. da Costa, M.S. de Gallego, A.M. Sette, O. Chateaubriand, H. Sankappanavar and E.H. Alves.

Once again, the symposium's proceedings were published by North-Holland, in its series *Studies in Logic and the Foundations of Mathematics* (Arruda, da Costa and Chuaqui, eds., 1980). The title chosen for the volume was *Mathematical Logic in Latin America*, and the dedicatory was in honor of Prof. Alfred Tarski.

In addition to the Latin American symposia, an extraordinary impulse to research in Logic in Brazil was given with the establishment in 1976 of the Centre for Logic, Epistemology and the History of Science (CLE) at the State University of Campinas (UNICAMP).

With the great development of Logic in our country and with a number of Brazilian researchers being known internationally (in part due to publications in some of the top specialized periodicals in the world), it was natural that the idea of a Logic society that congregated Brazilian logicians would arise. The idea, indeed, was realized with the establishment of the Brazilian Logic Society (SBL) in 1979, by initiative of CLE. Its first president was N.C.A. da Costa and among its goals one may mention:

- a) To promote congresses, courses, seminars, scientific meetings and similar activities intended for promoting and developing Logic;
- b) To publish magazines and bulletins with contributions by national and foreign logicians in order to spread their activities and valuable work related to Logic;
- c) To stimulate and maintain an exchange with scientific institutions in the country and abroad.

A new generation of logicians, including many members of CLE and of international recognition, is now continuing the pioneering work that started with Tourasse Teixeira, da Costa and Arruda. The geographic distribution of Brazilian research groups in Logic, besides the group of Campinas, presently includes Rio de Janeiro, São Paulo, Recife, Curitiba, Florianópolis, Fortaleza and João Pessoa.

In 1993, as an indication of the social recognition of such work, the “Moinho Santista Prize”, the most important prize in Brazil, offered annually for intellectual achievement in a given area of knowledge, was awarded in the area of Mathematical Logic, and the winner was da Costa, while the “Youth Moinho Santista Prize”, offered to younger and recent Ph.D's, honoured Cosme D.B. Massi.

The present President of the Brazilian Logic Society is Itala M.L. D'Ottaviano and the present “Committee on Logic in Latin America” of the Association for Symbolic Logic has two logicians of CLE: I. M.L. D'Ottaviano (President of the Committee) and A. M. Sette.

2. *The Centre for Logic, Epistemology and the History of Science*

The Centre for Logic, Epistemology and the History of Science (CLE) of the State University of Campinas (UNICAMP, Brazil), projected and organized in 1976, was officially founded in 1977.

The Centre was conceived with the aim of promoting research in the fields of Logic, Epistemology and History of Science, as well as work of interdisciplinary nature, of organizing seminars and scientific meetings, promoting publications and maintaining academic interchanges with other research groups and institutions in Brazil and other countries.

Its members, presently more than one hundred, include qualified researchers from different departments of Unicamp and from numerous other universities, both in Brazil and abroad. Besides logicians and philosophers, social scientists, linguists, mathematicians, physicists, biologists, psychologists and professors from the areas of art, among others, have integrated CLE since its beginning.

The idealizer and first Director of CLE was Oswaldo Porchat Pereira (1977-1982), followed by Zeljko Loparic (1982-1986), Itala M. Loffredo D'Ottaviano (1986-1993) and Osmyr Faria Gabbi Jr. (since 1993).

Since its foundation CLE has regularly organized seminars and scientific conferences and meetings and other research activities. The Centre has also provided administrative and academic support for interdisciplinary Post-Graduate Courses, such as the Courses of Specialization in “Philosophical Foundations of Psychology and Psychoanalysis” and in “History of Science”, and the Post-Graduate Course in “Logic and Philosophy of Science” of the Philosophy Department of Unicamp (IFCH, UNICAMP).

CLE has also maintained the publication of two journals of international circulation and of a collection of books.

Besides an intense scientific and academic interchange, CLE has been the site of some scientific societies, such as the “Brazilian Logic Society”

(SBL), the "Brazilian History of Science Society" (SBHC) and the "National Association of Post-Graduation in Philosophy" (ANPOF).

The Centre's Library holds a significant collection of books, periodicals and other documents.

In addition to financial support provided by UNICAMP, the activities of the Centre for Logic are also supported by numerous other institutions, both Brazilian and foreign, especially the Fundação de Amparo à Pesquisa do Estado de São Paulo (FAPESP, São Paulo, Brazil), Conselho Nacional de Pesquisas (CNPq, Brazil), Coordenadoria de Aperfeiçoamento de Pessoal de Nível Superior (CAPES, Brazil), Financiadora de Estudos e Projetos (FINEP, Brazil), British Council (England), Conseil National des Recherches Scientifiques (CNRS, France), Consiglio Nazionale delle Ricerche (CNR, Italy), Alexander von Humboldt Stiftung (Germany), Fullbright Commission (USA) and National Science Foundation (NSF, USA).

2.1. *Seminars and Scientific Meetings*

CLE has promoted weekly regular Seminars in the areas of Logic, Epistemology and History of Science, with the participation of teachers of various Institutes and Departments of UNICAMP, of other Brazilian universities, and of visiting researchers and advanced post-graduate students. These have included Seminars in the following subjects: Logic, Epistemology of Natural Sciences, Epistemology of Human Sciences, History of Science, Ethnography of Science, Philosophy of Language, Philosophy, besides the CLE Interdisciplinary Seminars.

Since 1986 the Interdisciplinary Seminars have been coordinated by Michel M. Debrun. Until 1990 the work centered on the theme of "Order and Disorder", while presently the studies relate to "Self-organization and Information".

In particular, in the area of Logic, besides the weekly Logic Seminar, the group of the logicians of CLE maintains its regular Colloquium Logicae, an advanced seminar open to the whole academic community, with the participation of invited researchers.

Of the many regular conferences sponsored by CLE, one can mention the Brazilian Logic Conferences (since 1977), the Latin American Symposia on Mathematical Logic (since 1978), the History and Philosophy of Science Conferences (between 1978 and 1981), the History of Science Conferences (since 1985). Other important events were: Cle's 10 years Colloquium on Order and Disorder (1987), the International Conference on the Philosophy of Language (1991) and the Conferences of the National Association of Post-Graduation in Philosophy (ANPOF) (1994 and 1996).

2.2. *Latin American Symposia on Mathematical Logic (SLALM) and Brazilian Logic Conferences (EBL)*

The 7th and the 8th Latin American Symposia on Mathematical Logic took place in Brazil, respectively in Campinas (1985), coordinated by W.A. Carnielli and L.P. de Alcântara, and in João Pessoa (1989), coordinated by M.F. Dias. The 9th was held in Bahía Blanca, Argentina (1992), coordinated by M.I. Abad.

The 10th Latin American Symposium on Mathematical Logic was held at the Universidad de Los Andes in Bogotá, Colombia, in July 24-29, 1995, coordinated by X. Caicedo. Four invited short courses preceded the Symposium on July 17-22, at the Universidad Nacional de Colombia.

The Conference was dedicated to the memory of R. Chuaqui, who died in Santiago, Chile, in March of 1994, in recognition to his tireless support of the development of Logic in Latin America. He started the Latin American Logic Symposia in 1970 and participated actively in the organization of all of them. An opening address about his life and work was delivered at the X SLALM by Renato Lewin (Universidad Católica de Chile), and several of his former colleagues and students shared their remembrances of Professor Chuaqui.

The section of Logic of CLE decided to hold annual Brazilian Conferences on Logic, to congregate Brazilian logicians and to stimulate the research in the area. The first of these meetings (I EBL) took place in Campinas, in 1977, co-sponsored by the Institute of Mathematics, Statistics and Computer Sciences of UNICAMP. Participants from almost ten Brazilian universities attended the meeting. The proceedings of the conference were published in 1978 by Marcel Dekker Inc., New York: *Mathematical Logic, Proceedings of the First Brazilian Conference*, edited by A.I. Arruda, N.C.A. da Costa and R. Chuaqui.

In 1978, the II Brazilian Logic Conference (II EBL) was held, again in Campinas. In this meeting the goal was to increase the divulgation of logic between Brazilian students. Short courses and conferences were offered, in which some advanced aspects of logic were didactically treated. The meeting obtained great success, considering the presence of 53 professors and 101 students of several national universities.

Since 1979, the Brazilian Logic Society has co-sponsored the meetings.

The third Conference (III EBL) took place in Recife, in 1979, co-sponsored by the Federal University of Pernambuco. The proceedings with the papers presented at the meeting were edited by the Brazilian Logic Society.

Until 1982, five meetings were held (four in Campinas —UNICAMP— and one in Recife —PE). In the 6th meeting, in 1982, in the Federal University of Ceará, Fortaleza, it was decided that the periodicity would be altered from annual to biannual, in order to alternate the Brazilian Conferences with the Latin-American Symposia on Mathematical Logic.

In this perspective, the following meetings were as follows: VII EBL, PUC/RJ-Rio de Janeiro; VIII EBL-ITA/São José dos Campos; and IX EBL-PUC/SP-São Paulo.

The 10th Conference (X EBL) took place, in 1993, in Itatiaia, Rio de Janeiro. The X EBL was very successful, with the participation of the most expressive Brazilian logicians, and many Brazilian post-graduate students, whose work is mainly devoted to non-classical logics.

The proceedings of the 10th Brazilian Logic Conference, with the papers presented in the meeting, were published by *Coleção CLE* of the Centre for Logic, Epistemology and the History of Science with the title *Logic, Sets and Information* (W. A. Carnielli and L.C. P. D. Pereira, eds., 1995).

The conference was held in memory of Andres Raggio who, through his research in Logic, his enthusiasm for the subject, and his unique and wonderful personality, made such a decisive contribution to the development of logic in South America, especially in Brazil. Raggio was both teacher and friend to many of the participants at the Itatiaia Conference.

The XI EBL took place in Salvador, Bahia, with great success and with the presentation of 65 papers, including 37 papers of Brazilian logicians and 28 from abroad. The conference was a joint event with the third Workshop on Logic, Language, Information and Computation (WoLLIC96).

The topics of the meeting were: Non-classical Logics, Computability, Translations, Model Theory, Proof Theory, Philosophy of Logic, Set-theory and Algebraic Logic.

Among the Brazilian logicians we mention the following: Antonio Mário Sette (UNICAMP), Armando Haeberer (PUC-RJ), Décio Krause (UFPR), Carlos Cifuentes (UFPR), Edward Herman Hauesler (PUC-RJ), Elias H. Alves (UNESP, Marília), Francisco Antonio Doria (UFRJ), Francisco Miraglia Neto (USP), George Svetlichny (PUC-RJ), Gerson Zaverucha (COPPE/UFRJ), Irineu Bicudo (UNESP, Rio Claro), Itala M. Loffredo D'Ottaviano (UNICAMP), Jairo José da Silva (UNESP, Rio Claro), Jean-Yves Béziau (LNCC, Rio de Janeiro), Luiz Carlos P.D. Pereira (PUC-RJ), Mário Benevides (COPPE/UFRJ), Michael B. Wrigley (UNICAMP), Ofélia Tereza Alas (USP), Oswaldo Chateaubriand (PUC-RJ), Paulo Veloso (PUC-RJ), Walter A. Carnielli (UNICAMP).

The participation of invited professors from the USA, Europe and Latin America was very expressive. We mention some of them: Andreas Blass (USA), Carlos Augusto di Prisco (Venezuela), Christian Fermueller (Austria), Claudio Pizzi (Italy), Daniel Vanderveken (Canada), Daniele Mundici (Italy), Guilherme Rosado Haddock (Puerto Rico), Juliete Floyd (USA), Kosta Dosen (France), Manuel Corrada (Chile), Marta Sagastume (Argentina), Mathieu Marrion (Canada), Michal Krynicki (Poland), Nestor

Guillermo Martinez (Argentina), Renato Lewin (Chile), Ugo Moscato (Italy), Wilfred Hodges (England), Xavier Caicedo (Colombia).

2.3. *Publications*

The Centre publishes two journals of international circulation, *Manuscrito*: *Revista Internacional de Filosofia* (in Portuguese, Spanish, French and English), which has been published uninterruptedly since the Centre opened in 1977, and *Cadernos de História e Filosofia da Ciência*, which publishes articles in Portuguese and has been published since 1980.

Oswaldo Porchat Pereira was the Editor of *Manuscrito* until 1983, and Marcelo Dascal has been its Editor ever since. Michael O. Ghins was its Associate Editor from 1983 to 1991, while Michael B. Wrigley has been the Associate Editor since 1991.

The first Editor of *Cadernos de História e Filosofia da Ciência* was Zeljko Loparic (1980-1988), followed by Roberto de Andrade Martins (1988-1990), Michael O. Ghins (1990-1992) and Fátima R.R. Évora (since 1993).

The journal *Manuscrito* has already published 19 volumes, with 38 issues; the *Cadernos de História e Filosofia da Ciência* 10 issues with 4 supplements (1980-87), plus 12 issues in 8 volumes (since 1989).

A third journal, *The Journal of Non-Classical Logic* (JNCL), published in English and the first international journal devoted to the study of non-classical logic, was founded by CLE in 1982 and continuously sponsored by UNICAMP and FAPESP.

Its first Editor was Newton C.A. da Costa, having José Alexandre D. Guerzoni as Managing Editor (until 1988), and Luiz Paulo de Alcântara as Associate Editor (1988 and 1989). Itala M.L. D'Ottaviano and Luiz Paulo de Alcântara were the Editors of the Journal in 1990 and 1991. *The Journal of Non-Classical Logic* published 14 numbers in 8 volumes.

In 1992 the JNCL was unified, due to a formal agreement, with the *Journal of Applied Non-Classical Logics* which had started to be edited in 1991 in Toulouse, France.

The new publication corresponding to the fusion of the two journals was taken over by the publishing house Hermès (Paris) under the title of *Journal of Applied Non-Classical Logics* (JANCL), with L. Fariñas del Cerro (Toulouse) as the Editor-in-Chief. Some of the members of the board of the JNCL (N.C.A. da Costa, I.M.L. D'Ottaviano, E.G.K. López-Escobar and R.O. Cignoli) have joined the board of the new journal, and W.A. Carnielli is the Editor for Latin America. This unification was aimed at avoiding the dispersion of efforts, concentrating the common interest.

A new collection of books started being issued in 1987, under the title *Coleção CLE*. It is a series of books which consists of original works and is primarily, although not exclusively, aimed at a Latin American public with an interest in the fields of Logic, Epistemology and the History and Philosophy of Science.

Coleção CLE publishes, on average, two titles a year. It has been published in Portuguese (mainly), Spanish and English. Since 1987, I. M. L. D'Ottaviano is the Editor of *Coleção CLE* and published, until now, 20 volumes. Among these books, we mention 9 volumes published in the area of Logic:

- Cálculo Proposicional: uma Interação da Álgebra e da Lógica*, Francisco Miraglia Neto, v. 1.
A Regra W: Passado, Presente e Futuro, Edgard G. K. López-Escobar, v.2.
Sobre o Predicativismo em Hermann Weyl, Jairo José da Silva, v. 6.
N.A. Vasiliev e a Lógica Paraconsistente, Ayda Arruda, v. 7.
O Método dos Isomorfismos Parciais: um Estudo da Expressabilidade Matemática, José Carlos Cifuentes, v. 10.
Álgebras das Lógicas de Lukasiewicz, Roberto L.O. Cignoli, Itala M.L. D'Ottaviano and Daniele Mundici, v. 12.
Logic, Sets and Information, Walter A. Carnielli and Luiz Carlos P.D. Pereira (Orgs.), v. 14.
Tese de Church: Algumas Questões Histórico-conceituais, Rodolfo E. Biraben, v. 16.
Una Introducción a la Teoría de Conjuntos y los Fundamentos de las Matemáticas, Carlos A. Di Prisco, v. 20.

2.4. Scientific Interchange

The Centre for Logic, Epistemology and the History of Science has maintained an intense interchange of scientific and academic cooperation with high level teaching and research institutions.

Supported by the several institutions mentioned above, CLE has received the visiting of important researchers in the areas of Logic, Philosophy and History of Science, who have given conferences, cooperated with the graduate courses co-sponsored by CLE, ministrated courses and participated in the regular seminars and meetings promoted by CLE.

In these almost 20 years, CLE received more than 350 visitors. Among them, in the area of Logic we mention: E. Rasiowa (Warsaw), A. Raggio (Buenos Aires), Gonzalo Reyes (Montreal), R. Wojcicki (Warsaw), G.G. Granger (Collège de France), C. Rauzcher (Warsaw), G. Gabriel (Konstanz), D. Mundici (Milan), R. L. Epstein (Berkeley), R. Cignoli (Buenos Aires), D. Isaacson (Oxford), J. Luccas (Oxford), J. Diller (Münster), J. Paris (Manchester), C. Pizzi (Siena), C. Di Prisco (Caracas),

M. Krynicki (Warsaw), X. Caicedo (Bogotá), R. Chuaqui (Santiago), I. Mikenberg (Santiago), M. Dickmann (Paris), D. Pigozzi (Iowa), D. Vanderveken (Montreal), D. Marconi (Torino), E.G.K. López-Escobar (Maryland), G. Malinowski (Łódź), R. Sylvan (Canberra), E. Olaso (Buenos Aires), E. Rabossi (Buenos Aires).

3. *The Areas of Work of CLE and the Area of Logic*

Though mainly of interdisciplinary character, the research developed in the CLE is organized into four individual areas: Logic, Epistemology and Philosophy of Science, History of Science, and Interdisciplinary Studies (in the proper sense of the term).

The area of Epistemology and Philosophy of Science has concentrated under what we could call an "analytic perspective", understanding by this term the application of rigorous methods (including formal methods) both to formulate and to solve philosophical problems. The main areas of interest include the philosophy of formal sciences (logic, mathematics and foundations of computer science), philosophy of natural sciences (physics, biology, etc.) and philosophy of human sciences (psychology, psychoanalysis, sociology, etc.). Besides these, there is also a good interest in the philosophy of mind and philosophy of language.

The area of History of Science has gained certain impetus, mainly in the history of physics, in spite of the natural difficulties connected to the lack of tradition in this field in Brazil. CLE maintains an Archive for Documentation in the History of Sciences which primarily collects and organizes material from Brazilian and Latin-American sources.

The Interdisciplinary Studies constitute one of the strong points of CLE since its foundation. The creation of groups of mixed specialists in natural and formal sciences, philosophers, linguists and researchers in the human sciences has been stimulated, with the objective of making explicit the nature of questions of cross-disciplinary areas, their underlying difficulties, the methodology employed under the distinct approaches and the structural or ideological limitations which would affect the epistemological perspectives. Since 1986, CLE has been sponsoring a biweekly seminar on Interdisciplinary Studies, which aims not only at the study of proposals and empirical results from other areas but also the production of original contribution to the problems.

The work developed in the area of Logic is described below in more details.

3.1. *The Area of Logic*

Starting in 1993, the group of logicians of the Department of Mathematics of the State University of Campinas (UNICAMP) decided to move to the Department of Philosophy of that same University, accepting an invitation from the latter Department to unite with the philosophers which had for a long time worked in the area of Logic. This group of logicians, formed by Itala M.L. D'Ottaviano, Antonio Mário Sette and Walter A. Carnielli, joined Luiz Paulo de Alcântara, also emigrated from the Mathematics Department, and helped to consolidate the area of Logic and Foundations of Formal Sciences in the Department of Philosophy, where Carlos A. Lungarzo and José Alexandre Guerzoni were still active, and Andrés Raggio, Osvaldo Porchat Pereira, Luiz Carlos P. D. Pereira, Elias H. Alves and Andrea A. Loparic had worked for a long time, some of them having now retired.

This new configuration of researchers contributed to give a new profile to the Graduate Program in Logic and Philosophy of Science, now completely separated from the Graduate Program in Philosophy. This Graduate Program in Logic and Philosophy of Science gained a new organization, offering degrees of Master and Doctor with research options in the following research themes:

- Model and Proof Theory;
- Category Theory;
- Algebraic Aspects of Non-Classical Logics;
- Computability Theory;
- Foundations of Set Theory;
- Philosophy of Logic.

The Program has received candidates from all over Brazil, and also from South-American neighbor countries, and counts presently with about 20 students in different levels of work in progress. Students who have already received their degrees have now obtained positions in several public and private universities in Brazil.

Due to the similarity of interests, some researchers decided to unify their research perspectives creating the Group for Theoretical and Applied Logic (GLTA), formed by A. M. Sette, W. A. Carnielli, I. M D'Ottaviano, E. H. Alves and C. A. Lungarzo. One of the main interests of this Group is the investigation of the concept of translation between logical systems, which is the topic of a project financed by FAPESP ("Computational and Mathematical Aspects of Translations between Logics", coordinated by W. A. Carnielli) and congregating ten researchers from the University of São Paulo, State University of São Paulo at Rio Claro and Marília, and Federal University of Uberlândia, besides the logicians of the GLTA of UNICAMP. This project concentrates in the recovery of the historical

sources of the concept of translation and interpretation between logical systems, the significance of translations, an abstract definition of translation and of logical systems, and investigation of concrete cases of translation between well-known logic systems. Prototypical examples of questions of this sort are the following:

- to investigate the categorical aspects of the notion of translation between logical systems;
- to clarify the characterization of logical systems and translations as generalization of topological spaces and continuous functions;
- to obtain (or prove the impossibility of obtaining) a special type of translation from intuitionistic logic into classical logic;
- to study (via translations) the question of duality between many-valued logics (like three-valued paraconsistent and paracomplete calculi), and to translate such systems into modal systems;
- to investigate properties of translation between programming languages.

Partial results have been obtained in some of these topics, which are being reported in the works mentioned in the References.

The Group has produced other works in the areas of algebrization of non-classical logics, foundations and applications of paraconsistent logic, model theory and proof theory of many-valued, paraconsistent and fuzzy logics, foundations of set theory and more recently on abstract semantics for contemporary logic (see the references).

The term contemporary logic has been coined in substitution of non-classical logic, based on the observation that most of the current research in formal logic (including computer science) falls under the label of “non-classical”. Contemporary logic, thus, seems to be a more appropriate descriptive name for this area which has received the attention of such a great number of researchers and has proved to be not only of practical interest but also subject of philosophical attention.

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