

FOREWORD

This issue of *Principia* is the third volume of the proceedings of the *CLE/AIPS Event — Science, Truth and Consistency*, held at the University of Campinas (Unicamp), in Campinas, State of São Paulo, Brazil, during August 23-28, 2009, under the joint sponsorship of the Centre for Logic, Epistemology and the History of Science (CLE) of Unicamp and of the International Academy of Philosophy of Science (AIPS), based in Brussels. The meeting was meant as a tribute to the eightieth birthday of Prof. Dr. Newton Carneiro Affonso da Costa, the pioneer Brazilian researcher in the areas of logic and philosophy of science.

The International Academy of Philosophy of Science (AIPS) was officially founded on January 22, 1949 in Brussels, with the aim of promoting the intellectual cooperation of scientists and philosophers of different backgrounds, concerned with the synthesis of science, philosophy and theology, especially at a time when a demand for specialization was pressing universities worldwide. Among its founder members were not only scientists concerned with such synthesis, such as Bernays, Beth, Born, Bridge, Carnap, Church, Curry, Destouches, Frank, Gonseth, Heisenberg, Kleene, Kotarbinski, Pauli, Piaget, Poly, Popper, Sierpinski, Schrödinger, Whittaker, Wiener, Yukawa, but scientists creators of innovative new theories such as Einstein (relativity), Bohr (quantum mechanics), de Broglie (wave mechanics), Brouwer (intuitionism) and Fréchet (abstract sets and symmetric spaces). Since its creation, the Academy organized 50 regular meetings in various European countries, in the United States, Mexico and Peru.

The Centre for Logic, Epistemology and the History of Science (CLE) at Unicamp, officially established on April 7, 1977, aims at bringing together scientists from the various branches of scientific and philosophical knowledge, having more than a hundred members and having promoted more than a hundred medium and large size events. The Centre is the editor house of *Manuscrito – International Journal of Philosophy, Cadernos de História e Filosofia da Ciência* (Cahiers of History and Philosophy of Science), and the electronic journals *CLE e-Prints* and *Kant e-Prints*, and the book series *Coleção CLE* (CLE Collections). *The Journal of Non-Classical Logic*, created by CLE in 1982 and merged with the *Journal of Applied Non-Classical Logics* in 1992, was the first international journal dedicated to non-classical logics.

This CLE/AIPS 2009 Event was the first meeting of AIPS in Brazil, having brought together internationally renowned researches in philosophy, logic, epistemology, history and philosophy of science, with the purpose of discussing a wide variety of topics of highest academic interest, focused on issues related to the work of da Costa, such

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as: philosophy, philosophy of science, non-classical logic, history and philosophy of logic, among others, with emphasis on interdisciplinarity.

Newton Carneiro Affonso da Costa has known how to crystallize, in a series of logical calculations, the power of contradictory reasoning in science and philosophy.

Conceived between 1954 and 1958, and presented in seminars and conferences at the Federal University of Paraná (UFPr) and at the University of São Paulo (USP), da Costa's paraconsistent calculi show mathematically that contradictions can be profitably kept in theories and rational contexts that express knowledge. Moreover, his calculi were the first to bestow the formal tools needed for processing the contradictions that the new science, together with the old philosophy, were looking for.

In the years 1950 da Costa began to develop his ideas about the importance of the study of contradictory theories. Having presented his ideas at the meeting of the Brazilian Society for the Advancement of Science (SBPC) held in Curitiba in July 1962, da Costa published his first notes about inconsistent but non-trivial calculi in the journal *Ciência e Cultura* (Science and Culture) in the same year.

Beginning with his Thesis — *Sistemas Formais Inconsistentes (Inconsistent Formal Systems)*, in which the objectives of his pioneer work are clearly defined — da Costa initiates, in 1963, the publication of a series of papers in the *Comptes Rendus de l'Académie de Sciences de Paris*, in which he introduces his well known hierarchies of logical calculi for the study of *inconsistent* (contradictory) but *non-trivial* theories.

Since 1964, da Costa's logics have been wide-ranging studied and many authors have contributed to the development of such logics and of paraconsistent logic in general.

Da Costa, his disciples and collaborators have obtained relevant results concerning the semantics and decidability of paraconsistent systems and a general theory of valuations, algebraic structures associated to such systems, paraconsistent set theories, logics of higher order, model theory, paraconsistent differential calculi and some recent applications to informatics, computer science, engineering, medicine and technology.

The development of paraconsistent logic has originated important philosophical problems, has opened several research areas and has propiciated the solution of important questions of the foundations of science.

Several applications of paraconsistent logics have been developed, such as: theories based on semantically closed languages, ethics, doxastic, deontic and epistemic logics, theory of probability, foundations of quantum mechanics, artificial intelligence, cognitive sciences, foundations of the infinitesimal calculus, foundations of science and its philosophical analysis.

One of the relevant concepts, formally and rigorously introduced by da Costa, is his concept of *quasi-truth*, a pragmatic notion of truth that generalizes Tarski's correspondence definition of truth.

For da Costa the concept of quasi-truth is a truth concept inherent to the empirical sciences, in particular to physical theories. It can be shown that the logic of quasi-truth is paraconsistent and such a logic is reduced to classical logic when quasi-truth is identified with truth. Hence, paraconsistent logic may be seen as the global logic of science.

Da Costa taught at the Federal University of Paraná (UFPr), University of São Paulo (USP) and State University of Campinas (Unicamp), being nowadays invited Collaborator Professor at the Federal University of Santa Catarina (UFSC), Brazil.

He had an important role in creating the Centre for Logic, Epistemology and the History of Science (CLE) at Unicamp in 1976, having conceived in 1977 the creation of the Brazilian Logic Society (SBL) and having been its first President. Yet in the 70's da Costa was also one of the conceivers of the Latin-American Symposia on Mathematical Logic, sponsored by the Association of Symbolic Logic, whose Committee on Logic in Latin-America he chaired during 1970-1976.

In 1982 he was the founding editor of the first international journal in the area of non-classical logics, *The Journal of Non-Classical Logic*, that was merged in 1991 with the *Journal of Applied Non-Classical Logics*, edited by Hermès/Lavoisier – France.

Among the awards he has received during his career we may mention: *Moinho Santista Prize*, 1993; *Jabuti Prize in Exact Sciences*, 1995; *Ordem do Pinheiro Medal* of the State of Paraná Government, for scientific merit, 1996; *Scientific Medal of Merit "Nicolaus Copernicus"*, awarded by the University of Toruń, Poland, 1998; *Scientific Merit Medal* of the Federal University of Paraná/Association of Former Students, 1998; *Citizen Emeritus of Paraná*, for scientific merit. Da Costa is also a member of several academies, including: Honorary Member of the *Institute of Philosophy of Peru*, 1975; Honorary Member of the *Research Institute of Philosophy of the University of Lima*, 1980; Corresponding Member of the *Academy of Science of Chile*, 1982; Member of the *Academy of Science s of the State of São Paulo*, Brazil, 1978; Member of the *International Institute of Philosophy* in Paris, 1989; and Honorary Member of *AIPS*.

In 1976, during the *III Latin-American Symposium on Mathematical Logic* (III SLALM), held at Unicamp, the Peruvian philosopher and AIPS member Miró Quesada coined the term *paraconsistent logic* for expressing logics that could afford inconsistent but non-trivial theories; in 1984, the first two issues of volume 43 of *Studia Logica* were entirely dedicated to paraconsistent logic; in 1989 Philosophia Verlag published the first encyclopaedic book on paraconsistency, *Paraconsistent logic: essays on the inconsistent*, by Routley, Priest and Norman; in 2000, volume 125, n. 12, of *Synthèse* was dedicated to Newton da Costa.

The series of meetings "World Congress on Paraconsistency" began in 1994 in Ghent, Belgium, followed by the second edition in Juquehy, São Paulo, Brazil, in 2000, dedicated to da Costa's 70th birthday; the third and fourth editions were held in 2003 (Toulouse, France) and 2008 (Melbourne, Australia), respectively.

Since 1990, the item “paraconsistent logic” appears in the American Mathematical Society (AMS) Subject Classification.

Professor da Costa has been also dedicated to the guidance of several students in Master Dissertations and Doctoral Theses, helping to form the first generation of Brazilian logicians. Among them are: Ayda Ignez Arruda (his first student and collaborator), Antonio Mário Sette, Elias Humberto Alves, Lafayette de Moraes, Luiz Paulo de Alcântara, Andrea M. Altino Loparić, Walter Carnielli, Tarcísio Pequeno, Décio Krause, Edélcio de Souza, Juliano Maranhão and Ítala M. Loffredo D'Ottaviano.

His scientific descendants have occupied academic positions in several Brazilian institutions and in universities in Argentina, Colombia, Switzerland, Germany, France and the United States of America.

Da Costa has dealt with several domains, such as mathematics, the foundations of mathematics, logic and physics, in particular non-classical logics, relativity theory and quantum mechanics, focusing on philosophical topics such as the metaphysics of quantum field theory and the nature of the logic that underlies ethics.

As of today, Newton da Costa has published around 250 papers, books, articles and notes. More than 3000 citations of his books and papers, in more than 10 languages are known. He has been visiting scholar in research institutions in the Americas, Europe and Australasia.

The magnitude and impact of da Costa's work made him one of the most cited Brazilian scientists. Specialized meetings have been devoted, in part or in whole, to discuss and debate his work in Brazil, Belgium, Poland, United States, Canada, Denmark and Italy.

The creative and innovative work of da Costa and his unquestionable academic leadership were crucial to the emergence of an internationally recognized “Brazilian School of Logic”.

We, the guest editors of this volume, are proud of being among his collaborators and friends.

The *CLE/AIPS Event* was attended by over one hundred members of the international philosophical — scientific community, featuring CLE and AIPS members and former da Costa's students and collaborators.

During the event Prof. da Costa was awarded with the title of “Professor Emeritus of the University of Campinas”. This deliberation of the University Board was a fair homage to this intellectual and teacher who, with his example of work, dedication and ethical behaviour, has so much contributed to the development and academic quality of Unicamp and has so much ennobled the Brazilian Philosophy and Science.

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