

and is addressed to mathematicians and engineers.

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NEWS

A debate on “Mathematical research in Portugal: trends, organization and perspectives” was held in Coimbra on 6, 7 December. This was an initiative of CIM.

The debate consisted of a sequence of sessions, with subjects introduced by invited speakers.

Around 80 people participated in the debate, representing research units in Mathematics and CIM associated institutions. CIM is considering the possibility of publishing a book with the contributions to the debate.

Support from JNICT, CMAF and CMUC is acknowledged.

PROGRAM

O financiamento do ensino superior e a investigação
Eduardo Marçal Grilo (Minister of Education)

O processo de avaliação de 1996
Irene Fonseca (Carnegie Mellon University e Max Planck Institut - Leipzig)

O futuro da avaliação

Luís Magalhães (Fundação para a Ciência e Tecnologia)

A Matemática e a Economia portuguesa

Artur Alves (Universidade de Coimbra)

Luís Trabucho (CMAF - Lisbon)

A organização institucional da investigação

Fernando Dias Agudo (Academia das Ciências)

José Francisco Rodrigues (CMAF - Lisbon)

Cultura vs. especialização

Maria Paula Oliveira (CMUC)

Teresa Monteiro Fernandes (CMAF - Lisbon)

Áreas preferenciais de investigação

Eduardo Rêgo (Centro de Mat. da Univ. do Porto)

João Paulo Dias (CMAF - Lisbon)

Escolas nacionais de Matemática

Ana Bela Cruzeiro (Grupo de Física-Mat. - Lisbon)

Graciano de Oliveira (CMUC) ▽

FIVE QUESTIONS TO JOÃO CARAÇA

João Caraça, who has a D. Phil. in Nuclear Physics from Oxford University and gained his Aggregate Professorship in Physics from Lisbon University, is Director of the Science Department at the Calouste Gulbenkian Foundation, and Professor at the School of Business and Management at the Technical University of Lisbon, where he supervises the Master's Degree in Economics and Management of Science and Technology. He is also the science adviser of the President of the Republic.

His interests lie mostly in the areas of science and technology policy, and in prospective studies. He has written over a hundred scientific papers and books including *From Knowing to Doing: Why Organize Science?* (*Do Saber ao Fazer: Porquê Organizar a Ciência?*; 1993) and *Science (Ciência)*; 1997), and collaborated in *Limits to Competition (Limites à Competição)*; 1994).

The portuguese scientific community has greatly benefited from Professor Caraça's activities in the Calouste Gulbenkian Foundation and JNICT. We would like to mention the strong interest he showed in the possibility of having some CIM activities funded by the Calouste Gulbenkian Foundation.

If you don't mind, I would like to begin with a rather abrupt question. Professor Caraça, What is Science?

‘As I have tried to explain in my book, science is a particular way of conjecturing about reality which cannot easily be summed up by a simple definition or

schematic phrase. It is a collection of responses which have evolved over time and result from different perspectives: the historical perspective; the world vision; epistemological perspective; learning, cultural, social, communicational perspectives etc.



It may be said, however, that science, as a specific area of disciplinary knowledge that requires very precise language, exists on an immaterial dimension; that is to say, it only comes into being because it is communicated, because its hypotheses are continually being

tested, checked and verified (or refuted), incessantly “infecting” new brains and serving as a base for new hypotheses. The aim of this communicational network is to gain a better understanding of our interaction with nature. The criteria and procedures with which science examines truth (the so-called “scientific method”) are incomprehensible without a strategy, as is the existence of distinct scientific communities.

You have published other books on a similar theme to *What is Science? (O que é Ciência?)*; for example, *From Knowing to Doing: Why organize Science? (“Do saber ao fazer: Porquê organizar a Ciência?”)*, Gradiva, 1993). Do you have any other projects in this area?

‘Yes, I have. I have already finished planning a book, in collaboration with Prof. Manuel Maria Carrilho, about the relationship between knowledge and power throughout history. But obviously, for the actual writing of the book, the authors require a certain amount of shared space and time. Even though it is difficult at the moment, this is such an interesting and fruitful project that I am sure that it will not be shelved.’

You are the Director of the Science Department at the Calouste Gulbenkian Foundation. What exactly is that department, and as director, what kinds of problems have you had to deal with?

‘The C.G.F. Science Department awards grants to stimulate scientific culture and scientific research in Portugal. According to the North American definition, the Science Department corresponds to the operation of the Foundation as a “grant-giving institution” within the area of science. It has essentially two roles: firstly, to support scientific culture and advanced-level training, and secondly, to stimulate scientific creativity.

The first aspect involves: the organization of scientific exhibitions, the launching of journals and books, the training of professionals in the area of scientific journalism, supporting experimental education in schools, promoting exchanges and meetings (such as the “Gulbenkian Professor’s” programme) and advanced training in the areas of biology and medicine (for example, it co-finances the “Gulbenkian Doctorate in Biology and Medicine”). The second aspect involves providing support for university research reinforcement programmes and interdisciplinary studies into science and society: the Gulbenkian Prize for Science, one of the most prestigious in the area, has been awarded annually since 1976, and incentives are offered to encourage the work of young researchers (aged under 30) submitted to an annual selection procedure (the “Gulbenkian Programme to Stimulate Research”).

The aims and activities of my department are very interesting. During the ten years in which I have been responsible for its coordination, there have naturally arisen problems and challenging situations: firstly, there is the question of financial resources, which are (always) insufficient; secondly, new ways to stimulate research have continually to be reinvented (since this is the true *raison d’être* of a Foundation) in order to keep in line with changing times; finally, C.G.F. has to

play a more active role in science in our country, with the aim of making “science” a priority for Portuguese society in the 21st century.’

Before formulating the next question, a brief quotation:

“One thing is certain: against science, without that knowledge which is created and used every day, which pulsates in the brains of the members of the scientific community and which illuminates those who learn it, generation after generation, it will not be possible to arrive at the 21 st century.”

“O que é Ciência”

How do you envisage the future for institutions like the International Centre for Mathematics in Portugal at the turn of the century?

‘It is natural that institutions like the CIM should emerge, and this is an indication of the maturity of the scientific community. Science cannot be circumscribed by physical or intellectual boundaries; it is through systematic communication between good interlocutors that new ideas and better ideas are generated, circulated, internalized. This does not mean that university departments, with their discipline-based structure, should disappear – on the contrary; however, these can no longer be the only pillars of the construction of new science. Research is by nature an interdisciplinary activity: without the courage to cross the boundaries of knowledge, learning does not take place.’

My last question is almost inevitable. We know that you were very young when your father died. Nevertheless, as Bento de Jesus Caraça was very influential during the 1930’s and 40’s in Portugal, there must certainly have been some reflection in your own work. I hope that it would not be too intrusive if I asked you to talk about this?

‘This is a part of my life which I have been learning to open up to others. Obviously, the conscious memories that I have of my father are very few (I was only three when he died); but perhaps you mean the other kind of influence: the long shelves of books that I would contemplate during my childhood; the contact with my mother and other relatives and friends who always tried to transmit some of the moments, hours, years that they shared with my father; his extraordinary conference papers, which I devoured as an adolescent; the perspectives which came to me out of the luminous pages of the “Fundamental Concepts of Mathematics”, and later, his books of physics and philosophy, with hundreds and hundreds of annotations, references and exclamations, which I could compare with my own opinions.

Obviously there is still a lot left to say. But there is always a subsequent occasion. I am very pleased to have inherited from my father a profound and unrestrained love for science, knowledge and culture, and also the certainty that, in the end, the only thing that matters is the solidarity that connects the collective soul of humanity.’