



CHAOS . ORDER . CATASTROPHE .

At the
National Centre for the Performing Arts, Bombay
October 5 to October 10, 1987

PROGRAMME

Monday, October 5, 1987

- 9.30 a.m. Welcome address by
Jamshed J. Bhabha
Trustee-in-charge
National Centre for the Performing Arts, Bombay
and
Anke Wiegand-Kanzaki
Director
Max Mueller Bhavan, Bombay
- 10.00 a.m. Inaugural Session
Creativity and Disorder
— **E.C. George Sudarshan**
- 11.00 a.m. — 11.30 a.m. Tea Break
- 11.30 a.m. **Aristotelian Physics and Theory of Catastrophe**
— **René Thom**
- 1.00 p.m. — 2.30 p.m. Lunch
- 2.30 p.m. **Structure, Energy and Transformation in Therapeutic Change**
— **David Boadella**
- 4.00 p.m. — 4.30 p.m. Tea Break
- 4.30 p.m. Brief presentations by
Partha Ghose
Mustansir Barma

Tuesday, October 6, 1987

- 9.30 a.m. **Chaos in Physical Sciences**
— **R. Ramaswamy**
- 11.00 a.m. — 11.30 a.m. Tea Break
- 11.30 a.m. **Cultural Perspectives**
— **Kapila Vatsyayan**
- 1.00 p.m. — 2.30 p.m. Lunch
- 2.30 p.m. Video film **"Violence in Stadiums - Headlines and Reality"** followed by a presentation by **Kurt Weis.**

Wednesday, October 7, 1987

- 9.30 a.m. **Catastrophe of Meaning**
— **Dietmar Kamper**
- 11.00 a.m. — 11.30 a.m. Tea Break
- 11.30 a.m. **Disease causes Chaos**
— **N.V. Joshi**
- 1.00 p.m. — 2.30 p.m. Lunch
- 2.30 p.m. (To be announced)
— **Ramkrishna Mukherjee**
- 4.00 p.m. — 4.30 p.m. Tea Break
- 4.30 p.m. **"Nuclear Winter"** a film by the Films Division.

Thursday, October 8, 1987

- 9.30 a.m. **Order and Chaos in Chemical and Biochemical Patterns**
— **Stefan Mueller**
- 11.00 a.m. — 11.30 a.m. Tea Break
- 11.30 a.m. **Observations on the Process of Civilisation**
— **Examples of Behavioural Changes in Germany**
— **Peter Gleichmann**
- 1.00 p.m. — 2.30 p.m. Lunch
- 2.30 p.m. **Catastrophe in the Survival of the Megapodes or Thermometer Birds**
— **T.A. Davis**
- 4.00 p.m. — 4.30 p.m. Tea

Friday, October 9, 1987

- 9.30 a.m. **New Developments in Systems Theories**
— **Niklas Luhmann**
- 11.00 a.m. — 11.30 a.m. Tea Break
- 11.30 a.m. **Stochastic Models for Social Processes**
— **Karmeshu**
- 1.00 p.m. — 2.30 p.m. Lunch
- 2.30 p.m. **Change, Continuity and Chaos in Indian Society**
— **Victor D'Souza**
- 4.00 p.m. — 4.30 p.m. Tea Break
- 4.30 p.m. Brief Presentation by
Ajay Patwardhan

Saturday, October 10, 1987

- 9.30 a.m. **Social Crises in India**
— **Yogendra Singh**
- 11.00 a.m. — 11.30 a.m. Tea Break
- 11.30 a.m. **General Discussion and Summing Up**
- 1.00 p.m. Vote of thanks by **Anke Wiegand-Kanzaki**
- 1.30 p.m. Lunch

Evening Programmes

Tuesday, October 6, 1987

6.30 p.m. at the Alliance Francaise
Lecture by Prof. René Thom

Thursday, October 8, 1987

6.30 p.m. at the Little Theatre, NCPA
A lecture demonstration on Fractals.
by Sudhir Phatak.

Friday, October 9, 1987

6.30 p.m. at the Little Theatre, NCPA
Talk by Dr. Kurt Weis on "Violence in Stadiums - Headlines and Reality" - accompanied by a video film of the same title.

An exhibition of FRACTALS will be on view at the Jehangir Nicholson Gallery of Modern Art from Monday, October 5, to Saturday, October 10, 1987 (both days inclusive) from 11.00 a.m. to 7.00 p.m.

Organised by :
**Alliance Francaise
Max Mueller Bhavans
National Centre for the Performing Arts
Tata Institute of Fundamental Research**

Speakers :

Mr. David Boadella
Prof. Dr. T.A. Davis
Prof. Dr. Victor D'Souza
Prof. Dr. Peter Gleichmann
Dr. N.V. Joshi
Prof. Dr. Dietmar Kamper
Prof. Karmeshu

Prof. Dr. Niklas Luhmann
Dr. Ramkrishna Mukherjee
Prof. Dr. Stefan Mueller
Prof. Dr. R. Ramaswamy

Prof. Yogendra Singh

Prof. Dr. E.C. George Sudarshan

Prof. Dr. René Thom
Dr. Kapila Vatsyayan
Prof. Dr. Kurt Weis

Centre for Biosynthesis, London.
J.B.S. Haldane Research Centre, Nagercoil
Indian Institute of Education, Bombay.
Institut fuer Soziologie, University of Hanover
Centre for Ecological Studies, Indian Institute of Science, Bangalore.
Institut fuer Soziologie, Free University Berlin.
School of Computer and Systems Sciences, Jawaharhal Nehru
University, New Delhi.
Fakultaet fuer Soziologie, University of Bielefeld.
Calcutta
Max-Planck-Institut fuer Ernaehrungsphysiologie, Dortmund
School of Physical Sciences, Jawaharlal Nehru University,
New Delhi.
Centre for the Study of Social Systems, Jawaharlal Nehru
University, New Delhi.
Centre for Particle Theory, University of Texas. Institute of Matscience,
Madras.
Institut des Hautes Etudes Scientifiques Bures-sur-Yvette.
Indira Gandhi National Centre for Arts, New Delhi.
Fakultaet fuer Wirtschafts- and Sozialwissenschaften, Technical
University, Munich.

Brief Presentations by :

Dr. Mustansir Barma
Dr. Partha Ghose
Mr. Ajay Patwardhan

Theoretical Physics Group, Tata Institute of Fundamental Research,
Bombay.
British Deputy High Commission, Calcutta.
St. Xaviers College, Bombay.

Observers :

Dr. Deepak Dhar
Ms. Duru Garwani
Mr. Sudheendre Kulkarni
Dr. V. Nanjundiah
Prof. L.K. Pandit
Dr. Sudhir Phatak
Dr. V.B. Sheorey
Prof. J.P.S. Uberoi

Theoretical Physics Group, Tata Institute of Fundamental Research,
Bombay.
Dept. of Sociology, University of Bombay.
Bombay.
Molecular Biology Group, Tata Institute of Fundamental Research,
Bombay.
Theoretical Physics Group, Tata Institute of Fundamental Research,
Bombay.
Department of Physics, Bombay University.
Physical Research Laboratory, Ahmedabad.
Dept. of Sociology, Delhi School of Economics.

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DIALOGUE AMONG THE SCIENCES

CHAOS ORDER CATASTROPHE - A SYMPOSIUM IN BOMBAY

On the third day of a week-long symposium on the subject "Chaos Order Catastrophe", held in Bombay recently, Prof. of Physics, Ram Ramaswamy of Jawaharlal Nehru University, New Delhi, urged the participants to make concerted efforts to cross the barriers of their respective fields and look for possibilities of a dialogue. Experts from different disciplines - mathematicians, natural scientists and sociologists - had assembled for discussions on an area, which is of current relevance to each of the individual sciences.

It was evident right from the beginning that generalisations were to be avoided, although the terminology common to the disciplines would seemingly warrant such an approach. On the other hand, discussions on inter-disciplinary lines kept rearing up, since the phenomena in question were of inter-disciplinary character, as pointed out by Dietmar Kamper, Sociologist from Berlin. It was the Goethe-Institute, known in India as Max Mueller Bhavan, named after the German Indologist Max Mueller (1823-1900), which had the courage to provide a forum for this dialogue. Ms. Anke Wiegand-Kanzaki, Director of the Institute in Bombay, had organised this international scientific symposium, following the suggestion of Hermann Haken, the founder of the inter-disciplinary subject of Synergetics. Those who lent her support were the Tata Institute of Fundamental Research, the National Centre for the Performing Arts and the Bombay branch of Alliance Francaise.

EASTERN MYTHS

Ms. Anke Wiegand-Kanzaki was motivated by a two-fold interest. On the one hand it was that contacts should be established

and conditions created for the as yet rare dialogue among scientists, and on the other hand the intention was to let Indians and Germans meet on the same level, that of research - and last but not least, to satisfy the expectations of the Indians for an exchange.

The term "Chaos" is witnessed at first in the cosmological myths of oriental origin. It denotes the concept of the unorganised and amorphous totality. Even in India, China, Japan, Indonesia, Polynesia and Africa, we encounter the concept in similar imageries. Mythologically and philosophically it evolved in a variety of ways and has filtered into the arts till today. It surfaces in a general manner in everyday conversation. It is only in recent years that it has found a usage in the fields of mathematics, physics, chemistry and biology. The term denotes processes in the development of a system that do not follow any visible regular patterns. These systems are described by deterministic equations, in which no accidental variable occurs, for example in the movement of a pendulum or of planets. Alongside such an exactly pre-determined behaviour, there can also be unpredictable behaviour patterns. As is known today, the smallest, practically unmeasurable changes in the initial values of a system lead to random, enormous deviations in the behaviour pattern in the long run - and therein lies for example the difficulty of a long-term prognosis in meteorology.

The scientists who had assembled in Bombay drew attention to the phenomenon of deterministic chaos in their own specific disciplines. They were unanimous in their opinion that it cannot be clubbed on to everything which looks disordered. Over and above all it was possible for them to come to an agreement over the term "non linear dynamics". A term used by physicists, chemists, biologists and others in the exploration of the time-space development of a random system, expressed through a simple equation of motion.

Often in totally diverse disciplines very similar equations are found, which result in analogous behaviour.

Sometimes it was not only the sociologists who faced difficulties in understanding the proceedings. René Thom, famous French mathematician, presently at the Institut des Hautes Etudes Scientifiques in Bures-sur-Yvette, spoke on Aristotelian Physics and followed it with his theory of mathematical catastrophe, whereby he tried to explain catastrophic phenomena occurring abruptly, like the origin of biological forms, economic crisis or military conflicts. But he himself was faced with an enigma when the other scholars developed their ideas further, based on his theory.

Ram Ramswamy made an impressive presentation of how Physics understands the phenomenon of "Chaos". Stefan Mueller of Max Planck Institute of Nutrition Physiology, Dortmund, spoke about order and chaos in bio-chemical patterns. Although both of them emphatically pointed out the strict limitations of these phenomena, they were most open-minded and keen for a dialogue. Mueller furthermore pointed out the need to further clarify the traditionally used meanings and metaphors. "The sociologists should not fight shy of mathematical statements, in order to ensure that an inter-disciplinary dialogue could be furthered. The fact is that the models of the non-linear dynamics have been used in "social" systems since long, and successfully at that, from the distribution of population to epidemiological and ecological issues. How much of this can be transferred to the human social behaviour would require further explanation."

N.V. Joshi of the Centre for ecological studies at the Indian Institute of Science, Bangalore, strongly rejected the idea of such a transfer. He spoke about how diseases

help control animal populations and drew attention to the "chaotic" behaviour among different kinds of insects, but he urged that this observation be restricted to the simple natural system. "My talk is not about things pertaining to human society and therefore I will make myself immune to attacks by sociologists." The discussion became a heated exchange. Joshi's attitude that stems from his conscientious methodology is understandable, on the other hand it shows a lack of readiness for a dialogue, although both Science and Sociology face analogous phenomena. But the moment a science arouses suspicion that it wants its methods to become a goal in itself, it meets with resistance.

The sociologist, Peter Gleichmann of Hanover University did take the opposite view and appealed for ground work to be done to create mutual awareness between the groups. The divide became sharper, when Gleichmann provokingly extended the sociological terms 'establishment' and 'outsiders' directly towards those present, defining the physicists as the establishment and the sociologists as the outsiders. Especially from Gleichmann one expected sociological aspects with 'catalytic effects' - likes of which are typical in the thinking of Norbert Elias whom Gleichmann referred to so emphatically.

Added to the problem of communication between the sociologists and the physicists were those between the Indian and the German sociologists. In all the talks by the Indians where they analysed their society, one realised that in a society where religious philosophy is active, it is difficult to attain quick political, economical and social changes or its progressive integration through a mental attitude. Whenever this is tried, chaotic situations cannot be ruled out, as mentioned by Victor D'Souza from Bombay. Yogendra Singh of JNU furnished extensive illustrative material towards the same in his presentation of the social crises in India.

It was indeed fortunate that Dietmar Kamper, philosopher and sociologist at the Free University Berlin, took the subject of the conference Chaos Order Catastrophe beyond the polarisation point between Physics and Sociology and discussed it in a general cultural context and raised questions of superordinate nature relevant to the Indians and the Europeans alike.

Starting from the premise that culture has no middle in statical orders and that its creative ability can be operated only through the unstable balance of chaos and order, Kamper promoted the idea of the human at play, who tries out something first and tries to comprehend it afterwards. Frantic search for meaning has something to do with the galloping loss of it and is not the way to creativity. It brings forth nothing but a rigidity of the traditional or newly-found orders. "The theoretical perspective of things has no chance today, especially in view of the culture of its origin." Kamper opened up a far-reaching perspective, when he expressed doubts over the issue, whether expression and concept are in accord. Referring to Paul Valéry's theory - that two dangers threaten the life of the spirit: chaos and order - Kamper defended the dual risk and sees culture, its intensity, its beauty in an order on the verge of chaos."

The symposium in Bombay is the beginning of a long road towards a final understanding. In any case, the semantics were clarified and it was felt that the phenomena of Chaos, peculiar to the different disciplines, were still inter-connected, even if there is no conclusive proof of it right now. Such discussion in future should draw in some more areas. To mention two examples: One could think of comparing the stochastic models of statistical physics, in which an element of contingency is expected right from

the beginning to that of the technique of composition (called stochastic music by Yannis Xenakis) which is based on the theory of statistic probabilities and the laws of chain reactions.

Another area would be a dialogue with the philosophers on the questionability of aesthetic judgement - an idea triggered off by the fractal or computer-images, an important aspect of "Chaos-Physics" and the impressions they create in the spectator of a fascinating "beauty in chaos". When scientific problems are discussed in an another cultural milieu, it helps to cross cultural barriers. The Indian metropolis Bombay, once called by the American Galbraith the only functioning anarchy of the world and where the discussions took place on by and large abstract concepts, proved for the European participants a thought-provoking and concrete background.

- Helmut Scheier

(translated from an article that appeared in the Süddeutsche Zeitung, November 27, 1987)