Seminar Series: Science in Culture and Critical Practice

New Cultures and Novel Methodologies between the Humanities and the Sciences

The 'Science in Culture and Critical Practice' seminar series will interrogate the contemporary status of the humanities and their relation to the sciences. It will do so in order to open up the question of future humanities engagements with scientific discourses in general and the implications of these for critical practice in particular.

The seminar aligns itself with critical and theoretical work that has emerged over the last decade in response to an urgent sense that the humanities will need to engage creatively with the sciences if they are to maintain their importance, vibrancy, and relevance in the 21st century. Situating itself within and building upon the tradition of literature and science studies, the seminar will explore innovations within humanities-based methodologies and approaches to critical practice. It will aim to move beyond some of the paradigms and approaches that have been influential in this area (e.g. the history of philosophy of science, the sociology of scientific knowledge, and science and technology studies). More specifically the seminar will bring contemporary theoretical debates *within* science and humanities-oriented engagements *with* science into dialogue with each other. Informed by the thought that neither the humanities nor the sciences taken in isolation from each other will be able to respond adequately to the most pressing questions of the 21st century, this seminar puts the space that both separates and joins these distinctive areas of knowledge centre stage and aims to build novel and critically transformative connections between the two.

1st Seminar
Professor Giuseppe Longo: 'Causality and Novelty Production, Physics vs Biology'
Friday 5 May 5.30pm
Alison Richard Building, Room S1
Sidgwick Site

Giuseppe Longo
CNRS et Ecole Normale Supérieure, Paris,
www.di.ens.fr/users/longo

Giuseppe Longo is a mathematician specialized in logic and computability and an epistemologist. For the past fifteen years, his work has concentrated on the relationship between mathematics and the natural sciences, in particular on evolutionary and organismal biology. His current project develops an epistemology of new interfaces focusing on historical correlations and on alternatives to the new alliance between computational formalisms and the governance of man and nature by algorithms and by supposedly objective 'optimality' methods. Longo's work can be situated at the forefront of contemporary debates within theoretical biology relating to the status and value of living organisms.

Giuseppe Longo: ‘Causality and Novelty Production, Physics vs Biology’

Causality in Physics has been framed in fundamental ‘structures of determination’, that is in mathematical frames that make intelligible and justify causal relations. As H. Weyl observed, ‘all fundamental principles in Physics are symmetry principles’. In particular, inert objects are ‘generic’ (they are invariant under replacement by a similar one, a falling stone or an electron is worth another, a symmetry principle), trajectories are ‘specific’, as geodetics in suitable phase spaces. The opposite will follow from a stress on historicity and specificity of life. Noble’s principle of ‘Biological relativity’ and Montévil-Mossio’s ‘closure of constraints’ will be a component of a dialectical approach to biological dynamics.

Some references (downloadable papers: https://www.di.ens.fr/users/longo/download.html):

G. Longo. ‘*From the century of the genome to the century of the organism: New theoretical approaches*’, a *Special issue* of *Progress in Biophysics and Molecular Biology*, A.M. Soto, G. Longo, D. Noble (Editors), Vol. 122, 2016.
——. “How Future Depends on Past Histories and Rare Events in Systems of Life”, *Foundations of Science*, (DOI), 23 (3):443-474, 2018.
——. *Le cauchemar de Prométhée*, PUF, Paris, April, 2023.

Speaker Bio
Giuseppe Longo is DRE CNRS, at the Cavaillès, République des Savoirs, interdisciplinary center of Ecole Normale Supérieure, Paris and a former Professor of Mathematical Logic and of Computer Science, University of Pisa.

He spent three years in the USA (Berkeley, MIT, Carnegie Mellon) as a researcher and Visiting Professor. He is co-author of about 140 papers. Founder and director (1990-2015) of *Mathematical Structures in Computer Science*, a Cambridge U.P. journal. He co-authored a book with A. Asperti, *Categories, Types and Structures* (M.I.T. Press, 1991). Longo then extended his research interests to Theoretical Biology and Epistemology (see the books with F. Bailly, *Mathematics and the Natural Sciences: The Physical Singularity of Life* (Hermann, Paris, 2006; Imperial College Press, London, 2011) and with M. Montévil, *Perspectives on Organisms: Biological Time, Symmetries and Singularities* (Springer, Berlin, 2014). Longo edited with A. Soto and D. Noble (and co-authored six papers of) *From the Century of the Genome to the Century of the Organism: New Theoretical Approaches*, a special issue of *Prog Biophys Mol Biol*, 122, 1, 2016. He is currently focusing on historical correlations and on alternatives to the new alliance between computational formalisms and the governance of man and nature by algorithms and by supposedly objective ‘optimality’ methods. He recently published ‘*Matematica e senso. Per non divenir macchine*’ (Mimesis, 2021); a largely revised and extended version in French of this book is ‘‘*Le cauchemar de Prométhée: les sciences et leurs limites*’’ (PUF, May 2023).