Explanation, Prediction, and Confirmation
Proceedings of the ESF Research Networking Programme

THE PHILOSOPHY OF SCIENCE IN A EUROPEAN PERSPECTIVE

Volume 2

Steering Committee

Maria Carla Galavotti, University of Bologna, Italy (Chair)
Diderik Batens, University of Ghent, Belgium
Claude Debru, Ecole Normale Supérieure, France
Javier Echeverria, Consejo Superior de Investigaciones Científicas, Spain
Michael Esfeld, University of Lausanne, Switzerland
Jan Faye, University of Copenhagen, Denmark
Olav Gjelsvik, University of Oslo, Norway
Theo Kuipers, University of Groningen, The Netherlands
Ladislav Kvasz, Comenius University, Slovak Republic
Adrian Miroiu, National School for Political Studies and Public Administration, Romania
Ilkka Niiniluoto, University of Helsinki, Finland
Tomasz Placek, Jagiellonian University, Poland
Demetris Portides, University of Cyprus, Cyprus
Wlodek Rabinowicz, Lund University, Sweden
Miklós Rédei, London School of Economics, United Kingdom (Co-Chair)
Friedrich Stadler, University of Vienna and Institut Wiener Kreis, Austria
Gregory Wheeler, New University of Lisbon, FCT, Portugal
Gereon Wolters, University of Konstanz, Germany (Co-Chair)

www.pse-esf.org
Dennis Dieks · Wenceslao J. Gonzalez · Stephan Hartmann · Thomas Uebel · Marcel Weber
Editors

Explanation, Prediction, and Confirmation
# Table of Contents

**Team A: Formal Methods**  
**Dennis Dieks**, Preface: Explanation, Prediction, Confirmation ............................7  
**John Worrall**, The No Miracles Intuition and the No Miracles Argument .......... 11  
**Stathis Psillos**, The Scope and Limits of the No Miracles Argument ...............23  
**Gregory Wheeler and Richard Scheines**, Causation, Association and Confirmation .................................................................................................................................37  
**Jon Williamson**, An Objective Bayesian Account of Confirmation ............... 53  
**Adam Grobler**, An Explication of the Use of Inference to the Best Explanation ................................................................................................................................. 83  
**Joke Meheus**, A Formal Logic for the Abduction of Singular Hypotheses ....... 93  
**Thomas Müller**, Probabilities in Branching Structures ..................................109

**Team B: Philosophy of the Natural and Life Sciences**  
**Raffaella Campaner**, Causality and Explanation: Issues from Epidemiology .125  
**Samuel Schindler**, Invariance, Mechanisms and Epidemiology .......................137  
**Alexander Reutlinger**, What’s Wrong with the Pragmatic-Ontic Account of Mechanistic Explanation? .............................................................................................................141  
**Michael Joffe**, Causality and Evidence Discovery in Epidemiology ............. 153  
**Gerd Graßhoff**, Inferences to Causal Relevance from Experiments ...............167  
**Alan C. Love and Andreas Hüttemann**, Comparing Part-Whole Reductive Explanations in Biology and Physics ................................................................. 183  
**Peter McLaughlin**, The Arrival of the Fittest ..................................................203  
**Thomas A. C. Reydon**, The Arrival of the Fittest *What?* ................................ 223

**Team C: Philosophy of the Cultural and Social Sciences**  
**Wolfgang Spohn**, Normativity is the Key to the Difference  
Between the Human and the Natural Sciences ..................................................241  
**Hans Lenk**, Methodological Higher-Level Interdisciplinarity by Scheme- 
Interpretationism: Against Methodological Separatism of the  
Natural, Social, and Human Sciences ..................................................................253  
**Jan Faye**, Explanation and Interpretation in the Sciences of Man ..................269  
**Peter Kemp**, Imagination and Explanation in History .......................................281  
**Paolo Garbolino**, Historical Narratives, Evidence, and Explanations ............293
RAIMO TUOMELA, Holistic Social Causation and Explanation ........................................... 305
WENCESLAO J. GONZALEZ, Complexity in Economics and Prediction:
The Role of Parsimonious Factors ...................................................................................... 319
MARIA G. BONOME, Prediction and Prescription in the Science of the Artificial:Information Science and Complexity ...................................................................................... 331

Team D: Philosophy of the Physical Sciences
JEREMY BUTTERFIELD, Against Pointillisme: A Call to Arms ........................................ 347
DENNIS DIEKS, The Gibbs Paradox Revisited .................................................................. 367
MAURO DORATO, The Alexandroff Present and Minkowski Spacetime:Why it Cannot Do What it has Been Asked to Do ......................................................... 379
TOMASZ PLACEK, A Locus for “Now” .............................................................................. 395
SVEND E. RUGH AND HENRIK ZINKERNAGEL, Weyl’s Principle, Cosmic Time and Quantum Fundamentalism ..................................................................................... 411
MICHEL P. SEEVINCK AND JOS UFFINK, Not Throwing out the Baby with the Bathwater: Bell’s Condition of Local CausalityMathematically ‘Sharp and Clean’ ..................................................................................... 425

Team E: History of the Philosophy of Science
BERNA KILINC, Kant on Chance and Explanation .............................................................. 453
MICHAEL STÖLTZNER, Shifting the (Non-Relativized) A Priori:Hans Reichenbach on Causality and Probability (1915–1932) ................................................................. 465
PIERRE WAGNER, Carnap’s Theories of Confirmation ..................................................... 477
ARTUR KOTERSKI, The Rise and Fall of Falsificationism in the Light of Neurath’s Criticism ......................................................................................................................... 487
MARIA CARLA GALAVOTTI, Probability and Pragmatism ............................................... 499
GRAHAM STEVENS, Russell on Non-Demonstrative Inference ........................................ 511
ELISABETH NEMETH, Edgar Zilsel on Historical Laws ................................................... 521
ERIC SCHLIESSLER, “Every System of Scientific Theory Involves Philosophical Assumptions” (Talcott Parsons). The Surprising Weberian Roots to Milton Friedman’s Methodology ........................................................................ 533
Index of Names ................................................................................................................ 545
This volume, the second in the Springer series *Philosophy of Science in a European Perspective*, contains selected papers from the workshops organised by the ESF Research Networking Programme *PSE* (The Philosophy of Science in a European Perspective) in 2009. The opening conference of this Programme (Vienna, 18-20 December 2008; see F. Stadler et al., eds., *The Present Situation in the Philosophy of Science*, Springer, 2010—the first volume of this series) first of all identified general directions in European philosophy of science research and defined points of contact between the different research teams that are part of the Programme. In comparison, the 2009 workshops placed a stronger emphasis on the further development of individual research lines of the teams, while keeping an eye on possibilities of cooperation and cross-fertilization.

The individual *PSE* teams and their areas of research are as follows:

Team A, Formal Methods (team leader Stephan Hartmann);
Team B, Philosophy of the Natural and Life Sciences (team leader Marcel Weber);
Team C, Philosophy of the Cultural and Social Sciences (team leader Wenceslao J. González);
Team D, Philosophy of the Physical Sciences (team leader Dennis Dieks);
Team E, History of the Philosophy of Science (team leader Thomas Uebel).

Under the umbrella of the general theme Explanation, Prediction and Confirmation, these teams organised three meetings in 2009. Team B organised a workshop on “Explanation, prediction, and confirmation in biology and medicine”, which took place in Konstanz from 2 to 4 October; with Marcel Weber as the local organizer and with support from the Konstanz “Zentrum für Philosophie und Wissenschaftstheorie”. Team C organised a workshop on “Explanation, prediction and confirmation in the social sciences: realm and limits” at the University of Amsterdam, from 26 to 27 October; the local organiser was Marcel Boumans. Teams A, D and E organised a joint meeting entitled “Physical and philosophical perspectives on probability, explanation and time”. This meeting took place at the Woudschoten Conference Center in Zeist from 19 to 20 October 2009; its local organiser was Dennis Dieks, supported by the “Institute for History and Foundations of Science” of Utrecht University. The combined presence of three research teams in this meeting offered the opportunity for holding two explicitly interdisciplinary sessions in addition to the solo sessions of the individual teams. These combined sessions focussed on areas of overlap and joint interest between Teams A and D and Teams A and E, respectively. A detailed report of the meeting can be found in the *Journal for General Philosophy of Science*, 2010, DOI 10.1007/s10838-010-9132-y; the results of the workshop of Team C are discussed in detail in the *Journal for General Philosophy of Science*, 2010, DOI 10.1007/s10838-010-9128-7.
A large audience, from all over Europe and from a variety of specialties, attended the several workshops: at the concluding lecture of the joint Zeist workshop almost one hundred people were present. Among these participants there were a substantial number of students and young scholars. The workshops thus accorded very well with the general idea behind PSE: establishing contacts between scholars from different European countries while furthering high level European research in the philosophy of science. Although the individual PSE teams focus on subjects that at first sight may seem quite different, there turned out to be many areas of overlap and common interest, with ample opportunity for joint work. For example, a connecting thread running through a substantial number of papers in this volume is the concept of probability: probability plays a central role in present-day discussions in formal epistemology, in the philosophy of the physical sciences, and in general methodological debates—it is central in discussions concerning explanation, prediction and confirmation. It became very clear at the meetings that such topics can profit considerably from intellectual exchange between various disciplines. Accordingly, it was decided that PSE should further pursue this path of cooperation and interdisciplinarity. In fact, probability will be a Leitmotiv in 2010, with 4 workshops on the role of probability and statistics in various disciplines; among which a joint workshop on topics of common interest to the philosophy of the life science and the philosophy of the physical sciences. The results will be available in the third volume of this PSE series!

Dennis Dieks
Utrecht University