

Contents

The Search for Philosophic Understanding of Scientific Theories

FREDERICK SUPPE

Introduction 3

I. Historical Background to the Received View 6

II. Development of the Received View 16

- A. Correspondence Rules and Cognitive Significance 17
- B. Interpretation of Theories: The Status of Theoretical Terms 27
- C. Logic of the Conditional 36
- D. Observational-Theoretical Distinction 45
- E. Final Version of the Received View 50
- F. Development of Science on the Received View:
Theory Reduction 53

III. Status of the Received View 57

IV. Criticism of the Received View 62

- A. How Adequate Is the Received View as a General Analysis of
Scientific Theories? 62
- B. Observational-Theoretical Distinction 66
 - 1. Analytic-Synthetic Distinction 67
 - 2. Observational-Theoretical Term Distinction 80
- C. Partial Interpretation 86
- D. Models 95
- E. Correspondence Rules 102
- F. Formalization Issues 110
- G. Conclusions on the Adequacy of the Received View 115

V. Alternatives to the Received View and Their Critics 119

- A. Skeptical Descriptive Analyses 120
- B. *Weltanschauungen* Analyses 125
 - 1. The Positions and Criticisms Specific to Them 127
 - (a) Toulmin 127
 - (b) Kuhn 135
 - (c) Hanson 151

- (d) Feyerabend's and Popper's Realisms 166
 - (i) *Popper* 166
 - (ii) *Feyerabend* 170
 - (e) *Bohm* 180
 - 2. General Criticisms of *Weltanschauungen* Analyses 191
 - (a) Observation 192
 - (b) Meaning Change 199
 - (c) Objectivity of Science 208
 - (d) General Conclusions on the Adequacy of the *Weltanschauungen* Approach 217
 - C. Semantic Approaches 221
 - D. Explanation and Theories 230
- VI. The Symposium: Main Issues Concerning the Structure of Theories—1969 233

Proceedings of the Symposium

SESSION I

Formulation and Formalization of Scientific Theories:

A Summary-Abstract, Carl G. Hempel 244

Discussion 255

SESSION II

The Structure of Theories and the Analysis of Data, Patrick Suppes 266

1. Deterministic Theories with Incorrigible Data 266

2. Deterministic Theories with Corrigible Data 271

3. Probabilistic Theories with Incorrigible Data 273

4. Probabilistic Theories with Corrigible Data 278

5. Some Philosophical Conclusions 281

Commentary on Suppes's "The Structure of Theories and the Analysis of Data" 284

Discussion 289

SESSION III

History and the Philosopher of Science, I. Bernard Cohen 308

1. Introduction 308

2. Galileo and the Science of Motion 315

3. 'Transformations' in the Development of Science:
The Concepts of 'Inertia' and 'State of Motion' 321

4. Newtonian Dynamics: The Second Law of Motion 327

- 5. Ambiguous History: Texts and References 335
- 6. Conclusion: The Philosopher *vs.* the Historian 344
- History and Philosophy of Science: A Reply to Cohen, Peter Achinstein 350**
- Discussion 361

SESSION IV

- Science as Perception-Communication, David Bohm 374**
- Professor Bohm's View of the Structure and Development of Theories, Robert L. Causey 392**
- Reply to Professor Causey, Jeffrey Bub 402**
- Discussion 409
- Reply to Discussion, David Bohm 420**

SESSION V

- Hilary Putnam's 'Scientific Explanation'. An Editorial Summary-Abstract 424**
- Putnam on the Corroboration of Theories, Bas C. van Fraassen 434**
- Discussion 437

SESSION VI

- Second Thoughts on Paradigms, Thomas S. Kuhn 459**
- Exemplars, Theories, and Disciplinary Matrixes, Frederick Suppe 483**
- Discussion 500

SESSION VII

- Scientific Theories and Their Domains, Dudley Shapere 518**
 - I. Framework of the Present Analysis 518
 - II. Aspects of the Concept of a Domain 525
 - III. Theoretical Problems, Lines of Research, and Scientific Theories 533
 - 1. The Periodic Table of Chemical Elements 534
 - 2. Spectroscopy 542
 - 3. Stellar Spectral Classification and Stellar Evolution 549
 - IV. Theoretical Inadequacies and Their Treatment 557
 - 1. Inadequacies of the Bohr Theory 558
 - A. Incompleteness 558
 - B. Simplification 560
 - C. Structure 562
 - 2. Treatment of Inadequacies in the Bohr Theory 562
- Editorial Interpolation: Shapere on the Instrumentalistic *vs.* Realistic Conceptions of Theories 566**

Heuristics and Justification in Scientific Research: Comments on Shapere, Thomas Nickles	571
1. The Standard Account of Theories	572
2. The Rationality of Scientific Decisions	574
3. Domains and Intertheoretic Reduction	582
Discussion	590

Postscript: The Structure of Scientific Theories, Stephen Toulmin	600
--	-----

Afterword — 1977

FREDERICK SUPPE

Introduction	617
I. Swan Song for Positivism	619
A. Explanation and Intertheoretical Reduction	619
B. Induction and Confirmation	624
II. The Waning of the <i>Weltanschauungen</i> Views	633
A. Hanson	634
B. Feyerabend and Kuhn	636
III. Historical Realism	650
A. History and Philosophy of Science	652
B. Rationality and the Growth of Scientific Knowledge	659
1. Lakatos	659
2. Toulmin	670
3. Shapere	682
4. Conclusions on the Growth of Scientific Knowledge	704
C. Conceptual Devices	706
D. Toward a Metaphysical and Epistemological Realism	716
IV. Conclusion: Philosophy of Science Today	729
Bibliography	731
Notes on Contributors	768
Index	773
Index for the Afterword	805