Carlo Cellucci

Rethinking Knowledge:

The Heuristic View
Contents

1 Introduction
   1.1. The Trauma of the Birth of Modern Science
   1.2. Radical Answers
   1.3. Moderate Answers
   1.4. Death of Philosophy?
   1.5. Criticisms by Scientists
   1.6. Why Still Philosophy?
   1.7. Organization of the Book

Part I The Nature of Philosophy

2 The Heuristic View
   2.1. The Characteristics of Philosophy
   2.2. Philosophy and the World
   2.3. Philosophy and Globality
   2.4. Philosophy and Essential Problems
   2.5. Philosophy and Knowledge
   2.6. Philosophy and the Armchair
   2.7. Philosophy and the Sciences
   2.8. Philosophy and the Results of the Sciences
   2.9. Philosophy and Method
   2.10 Philosophy and the Aim to Obtain Knowledge
   2.11. Philosophy and the Aim to Obtain Rules of Discovery
   2.12. Philosophy and the Birth of New Sciences
   2.13. Philosophy and the History of Philosophy
   2.14. Philosophy and Intuition
   2.15. Philosophy and Emotion
   2.16. Philosophy and the Solvability of Problems
   2.17. Philosophy and Progress
   2.18. Philosophy and Professionalization
   2.19. The Heuristic View and Russell’s View of Philosophy

3 The Foundationalist View
   3.1. The Foundationalist View and the Architectural Metaphor
   3.2. The Foundationalist View and the Infinite Regress Argument
   3.3. The Foundationalist View and the Appeal to Intuition
   3.4. The Foundationalist View and Mathematical Knowledge
   3.5. The Foundationalist View and the Knowledge of the External World
   3.6. Other Foundationalist Programs
   3.7. Inadequacy of the Architectonic Metaphor
3.8. The Weak Foundationalist View
3.9. The Alleged Death of Epistemology

4 The Limits of Doubt
4.1. The Problem of Doubt
4.2. The Doubts Raised by Two Ancient Schools
4.3. Aristotle’s Criticism of the Two Ancient Schools
4.4. Limits of Aristotle’s Solution
4.5. Self-Defeating Character of the Two Ancient Schools
4.6. Sextus Empiricus’ Equipollence Doubt
4.7. Descartes’ Demon Doubt
4.8. Descartes’ Dream Doubt
4.9. Hume’s Induction Doubt
4.10. The Basic Questions About Knowledge

5 Philosophy and Humanistic Disciplines
5.1. The View that Philosophy is a Humanistic Discipline
5.2. Relation with a Non-Analytic Trend
5.3. What is Scientism
5.4. Sciences and the World as it is in Itself
5.5. Sciences and the Independence of Perspective
5.6. Sciences and the Absolute Conception
5.7. Philosophy as Different from the Sciences
5.8. Philosophy and History
5.9. The Humanistic Disciplines Revisited

Part II Perspectives on Knowledge

6 Knowledge and Reality
6.1. The Question of the Relation of Knowledge with Reality
6.2. Naïve Realism
6.3. Representative Realism
6.4. Scientific Realism
6.5. Structural Realism
6.6. Semantic Structural Realism
6.7. Essentialist Realism
6.8. Perspectival Realism
6.9. Subjective Idealism
6.10. Knowledge and Ways of Apprehending the World
6.11. The Purpose of Knowledge
6.12. Knowledge and the Human Cognitive Apparatus
6.13. Knowledge and Things in Themselves

7 Knowledge, Truth and Plausibility
7.1 Science and Truth
7.2. Truth as Correspondence
7.3. Concept of Truth and Criterion of Truth
7.4. Impossibility of a Criterion of Truth, and Success
7.5. An Alleged Rehabilitation of Truth as Correspondence
7.6. Truth as Intuition of the Essence
7.7. Truth and Modern Science
7.8. Noumenal Claims
7.9. Alternative Concepts of Truth
7.10. Truth as Consistency
7.11. Truth as Systematic Coherence
7.12. Truth as Satisfiability
7.13. Truth as Provability
7.14. Plausibility
7.15. The Plausibility Test Procedure
7.16. Inference Rules, Plausibility, and Experience
7.17. Plausibility as Distinguished from Truth and Probability
7.18. Plausibility as Distinguished from Warranted Assertibility
7.19. Plausibility and Endoxa
7.20. Plausibility in Place of Truth

8 Knowledge and Objectivity, Certainty, Intuition
8.1. Objectivity as Independence of the Subject
8.2. Objectivity as a View from Nowhere
8.3. Objectivity as Invariance
8.4. Objectivity as Plausibility
8.5. Mathematics and Plausibility
8.6. Certainty
8.7. The Characters of Intuition
8.8. Counterexamples to Intuition
8.9. The Claims of Intuition

9 The Character of Knowledge
9.1. The Subject Matter of Epistemology
9.2. The Biological Role of Knowledge
9.3. Knowledge as a Natural Process
9.4. Knowledge and Consciousness
9.5. Knowledge and Evolution
9.6. Cultural Role of Knowledge
9.7. Biological Evolution and Cultural Evolution
9.8. Objections to the Thesis of Continuity
9.9. Scientific Knowledge and Evolution
9.10. Mathematical Knowledge and Evolution
9.11. Prejudices Against the Relation Mathematics-Evolution
9.12. Evolution and Teleology
9.13. Knowledge and Naturalism

Part III The Acquirement of Knowledge

10 The Method of Knowledge
10.1. Knowledge and the Deductive Method
10.2. Discovery and Inference
10.3. The Analytic-Synthetic Method
10.4. Inference and Containment
10.5. Non-Ampliability of Deductive Rules
10.6. Inference Rules and Usefulness
10.7. Original Formulation of the Analytic-Synthetic Method
10.8. Analytic-Synthetic Method and Intuition
10.9. The Axiomatic Method
10.10. The Abstract Axiomatic Method
10.11. The Analytic Method
10.12. Original Formulation of the Analytic Method
10.13. Origin of the Analytic Method
10.15. Analytic Method and Infinite Regress
10.16. Analytic Method and Abduction
10.17. Advantages of the Analytic Method
10.18. Further Advantages of the Analytic Method
10.19. Fortune of the Analytic Method

11  Knowledge as Problem Solving
11.1. Knowledge and Problems
11.2. The Origin of Problems
11.3. Problem Posing
11.4. Problem Solving
11.5. Knowledge as Problem Solving by the Analytic Method
11.6. Problem Solving, Knowing-How and Knowing-That
11.7. Problem Solving and Logic of Discovery
11.8. Problem Solving, Heuristic and Algorithmic Methods

12  Modeling Knowledge
12.1. Models of Science and Models in Science
12.2. The Analytic-Synthetic Model
12.3. The Disappearance of Analysis
12.4. The Deductive Model
12.5. Differences With Respect To the Analytic-Synthetic Model
12.6. Trivializing the Deduction of Consequences from Hypotheses
12.7. The Deductive Model and Closed Systems
12.8. The Abstract Deductive Model
12.9. Models of Science and Gödel’s Incompleteness Theorems
12.10. Curry’s Alleged Way Out
12.11. The Semantic Model
12.12. The Analytic Model
12.13. The Analytic Model and Open Systems
12.14. The Analytic Model and Gödel’s Incompleteness Theorems
12.15. Models in Science
12.16. The Deductive Model and Models in Science
12.17. The Abstract Deductive Model and Models in Science
12.18. The Semantic Model and Models in Science
12.19. The Analytic Model and Models in Science

13  Perceptual Knowledge
13.1. Philosophical and Psychological Theories of Perception
13.2. The View that Vision is a Passive Process
13.3. Vision and Mental Images
13.4. Vision as Problem Solving by the Analytic Method
13.5. Vision and the Limitations of the Eye
13.6. Evidence for Vision as Problem Solving by the Analytic Method
13.7. Objections to Vision as Problem Solving by the Analytic Method
13.8. Vision and Movement
13.9. Vision and Touch

14 A Priori Knowledge
14.1. The A Priori from Demonstration to Knowledge
14.2. A New View of A Priori Knowledge
14.3. A Priori for the Individual and A Posteriori for the Species
14.4. A Priori Knowledge as Obtained by Trial and Error
14.5. A Priori Knowledge as a Precondition for Inquiry
14.6. Objections to Kant’s View of A Priori Knowledge
14.7. A Priori Knowledge and Inborn Knowledge

Part IV Knowledge and Rationality

15 Knowledge and Reason
15.1. The Concept of Reason
15.2. Human Nature
15.3. Essential Relativity of the Concept of Reason
15.4. Natural and Artificial Reason
15.5. Reason and Emotion
15.6. Emotion as a Compensation for the Limitations of Reason
15.7. Knowledge and Emotion
15.8. Solving Problems and Emotion
15.9. Choice of Problems or Hypotheses, and Emotion
15.10. Scientific Knowledge and Emotion
15.11. Error and Emotion
15.12. Doubt and Emotion

16 Natural and Artificial Logic
16.1. Origin of the Distinction between Natural and Artificial Logic
16.2. Characteristics of Natural Logic
16.3. Objections to Natural Logic
16.4. The Need for an Extension of Logic
16.5. Discursive and Visual Logic
16.6. Integration between Discursive and Visual Logic
16.7. Relation Between Discursive and Visual Logic
16.8. Logic and Language
16.9. Logic and Reason
16.10. Logic and Evolution
16.11. Relation Between Natural and Artificial Logic

17 Knowledge and Error
17.1. The Heterogeneity View
17.2. Limitation of the Heterogeneity View
17.3. A Priori Knowledge and Error
17.4. Logic and Error
17.5. Mathematics and Error
17.6. Demonstration and Error
17.7. Fruitfulness of Error
17.8. Error and the Rationality of Hypothesis Formation
18 Knowledge and Mind
18.1. The View of Disembodied Knowledge
18.2. Shortcomings of the View of Disembodied Knowledge
18.3. Subjective Character of the View of Disembodied Knowledge
18.4. The View of Embodied Knowledge
18.5. Some Questions Raised by the View of Embodied Knowledge
18.6. The Sapient Paradox
18.7. The Extended Mind
18.8. The Strengthening of the Mind with External Processes
18.9. Extended Mind and Brain Plasticity
18.10. The External Processes Involved in Human Knowledge
18.11. Distributed Character of Knowledge
18.12. The Mind as an Incomplete Cognitive System
18.13. Knowledge and Other Minds

Part V Mathematical Knowledge

19 Two Approaches to Mathematical Knowledge
19.1. The Mainstream View and the Maverick View
19.2. The Mathematical Practice View
19.3. Limitations of the Maverick View
19.4. Further Limitations of the Maverick View
19.5. The Low Level Basis of Mathematics
19.6. Natural Mathematics
19.7. Artificial Mathematics
19.8. Limitations of the Empiricist View of Mind
19.9. Two Approaches to the Development of Mathematics
19.10. Asymmetry Between the Two Approaches

20 The Nature of Mathematical Knowledge
20.1. Two Misconceptions of Mathematical Knowledge
20.2. Mathematics as Problem Solving by the Analytic Method
20.3. Origin of This View
20.4. Objections to Mathematics as Problem Solving by the Analytic Method
20.5. Origin of the Question of What is a Mathematical Object
20.6. Mathematical Platonism
20.7. Early Modern Philosophers and Mathematical Objects
20.8. Mathematical Objects as Hypotheses
20.9. Characteristics of Mathematical Objects as Hypotheses
20.10. Mathematical Fictionalism
20.11. Hypotheses vs. Fictions
20.12. Mathematical Definitions
20.13. Mathematics and Intuition
20.14. Diagrams
20.15. The Proper Place of Diagrams

21 The Notion of Mathematical Demonstration
21.1. Two Notions of Demonstration
21.2. A Shortcoming of Axiomatic Demonstration
21.3. An Alleged Way Out for Axiomatic Demonstration
21.4. Other Shortcomings of Axiomatic Demonstration
21.5. Advantages of Analytic Demonstration
21.6. The Point of Analytic Demonstration
21.7. Analytic Demonstration and Intuition
21.8. Analytic Demonstration and Published Demonstrations
21.9. The Function of Axiomatic Demonstration
21.10. Hilbert’s Thesis
21.11. Mathematicians’ Proof
21.12. The Heuristic View of Mathematical Knowledge

22  Mathematical Explanation
22.1. Mathematical Explanation of Mathematical Facts
22.2. The Deductive View of Explanation
22.3. Aristotle on Explanation
22.4. Descartes on Explanation
22.5. Static and Dynamic Approach to Mathematical Explanation
22.6. Mathematical Explanation and Published Demonstrations
22.7. The Rhetorical Role of Axiomatic Demonstration
22.8. Functions of Explanatory Demonstration
22.9. Relevance to Scientific Practice
22.10. Global and Local View of Mathematical Explanation
22.11. Mathematical Understanding
22.12. Explanatory Demonstrations and Mathematical Understanding
22.13. Mathematical Explanation of Natural Facts
22.14. The Honeycomb Problem
22.15. The Mother Problem

23  Mathematical Beauty
23.1. Aesthetic Judgments and the Neuroscience of Aesthetics
23.2. Two Different Traditions about Mathematical Beauty
23.3. Mathematical Beauty as an Intrinsic Property
23.4. Mathematical Beauty as a Projection of the Observer
23.5. Rota’s Phenomenology of Mathematical Beauty
23.6. Some Limitations of Rota’s Views
23.7. Beauty and Perception
23.8. From Enlightenment to Understanding
23.9. Beauty in Works of Art
23.10. Beauty in Demonstrations
23.11. An Example of a Beautiful Demonstration
23.12. Differences in Beauty Between Geometrical Demonstrations
23.13. Differences in Beauty Between Non-Geometrical Demonstrations
23.14. An Example of a Beautiful Theorem
23.15. Beauty and Discovery
23.16. An Example of the Role of Beauty in Discovery
23.17. Epistemic Role of the Aesthetic Factors

24  The Applicability of Mathematics
24.1. Origin of the Question of the Applicability of Mathematics
24.2. The Applicability of Natural Mathematics
24.3. The Applicability of Artificial Mathematics
24.4. The Theological Explanation
24.5. The Parallelism Explanation
24.6. The Truth Explanation
24.7. The Structural Explanation
24.8. The Friendly Universe Explanation
24.9. The Mapping Explanation
24.10. Galileo’s Revolution and the Applicability of Mathematics
24.11. The Thesis that Mathematics is Adequate to Physics
24.12. Mathematics and Simplicity
24.13. Mathematics and Simplification
24.15. Mathematics and Approximations to Conceptualizations
24.16. The Pre-Established Armony Objection
24.17. The Applicability of Mathematics and Naturalism
24.18. On an Alternative Naturalistic Explanation of Applicability

Part VI Coda

25 Knowledge and the Meaning of Life
25.1. Knowledge and the Purpose of Life
25.2. Meaning of Life and Evolution
25.3. Meaning of Life and God
25.4. The Question: Why God?
25.5. Belief in God and Rationality
25.6. Morality and God
25.7. Intelligibility of the World and Naturalism
25.8. Meaning of Life from an External Point of View
25.9. Meaning of Life from an Internal Point of View
25.10. Happiness and the Meaning of Life
25.11. Happiness and Knowledge
25.12. The Nature of Happiness
25.13. Seeking Happiness in One’s Individual Life
25.14. Brevity and Value of Life
25.15. Knowledge as a Precondition of Happiness

References

Name Index

Subject Index