

Contents

<i>Editors' introduction</i>	v
Introduction: Science and pseudoscience	I
1 Falsification and the methodology of scientific research programmes	8
1 Science: reason or religion?	8
2 Fallibilism versus falsificationism	10
<i>a</i> Dogmatic (or naturalistic) falsificationism. The empirical basis	12
<i>b</i> Methodological falsificationism. The 'empirical basis'	20
<i>c</i> Sophisticated versus naive methodological falsificationism. Progressive and degenerating problemshifts	31
3 A methodology of scientific research programmes	47
<i>a</i> Negative heuristic: the 'hard core' of the programme	48
<i>b</i> Positive heuristic: the construction of the 'protective belt' and the relative autonomy of theoretical science	49
<i>c</i> Two illustrations: Prout and Bohr	52
1 Prout: a research programme progressing in an ocean of anomalies	53
2 Bohr: a research programme progressing on inconsistent foundations	55
<i>d</i> A new look at crucial experiments: the end of instant rationality	68
1 The Michelson–Morley experiment	73
2 The Lummer–Pringsheim experiments	79
3 Beta-decay versus conservation laws	81
4 Conclusion. The requirement of continuous growth	86
4 The Popperian versus the Kuhnian research programme	90
Appendix: Popper, falsificationism and the 'Duhem–Quine thesis'	93
2 History of science and its rational reconstructions	102
Introduction	102
1 Rival methodologies of science; rational reconstructions as guides to history	103
<i>a</i> Inductivism	103
<i>b</i> Conventionalism	105
<i>c</i> Methodological falsificationism	108
<i>d</i> Methodology of scientific research programmes	110
<i>e</i> Internal and external history	118
2 Critical comparison of methodologies: history as a test of its rational reconstructions	121
<i>a</i> Falsificationism as a meta-criterion: history 'falsifies' falsificationism (and any other methodology)	123

CONTENTS

b	The methodology of historiographical research programmes. History – to varying degrees – corroborates its rational reconstructions	131
c	Against aprioristic and anti-theoretical approaches to methodology	136
d	Conclusion	138
3	Popper on demarcation and induction	139
	Introduction	139
1	Popper on demarcation	140
a	Popper's game of science	140
b	How can one criticize the rules of the scientific game?	144
c	A quasi-Polanyiite 'falsification' of Popper's demarcation criterion	146
d	An amended demarcation criterion	148
e	An amended meta-criterion	151
2	Negative and positive solutions to the problem of induction: scepticism and fallibilism	154
a	The game of science and the search for truth	154
b	A plea to Popper for a whiff of 'inductivism'	159
4	(with Elie Zahar) Why did Copernicus's research programme supersede Ptolemy's?	168
	Introduction	168
1	Empiricist accounts of the 'Copernican Revolution'	169
2	Simplicism	173
3	Polyanyiite and Feyerabendian accounts of the Copernican revolution	176
4	The Copernican revolution in the light of the methodology of scientific research programmes	178
5	The Copernican revolution in the light of Zahar's new version of the methodology of scientific research programmes	184
6	A postscript on history of science and its rational reconstructions	189
5	Newton's effect on scientific standards	193
1	The justificationist high road to psychologism and mysticism	193
a	Justificationism and its two poles: dogmatism and scepticism	193
b	Psychologistic justificationism	195
c	Justificationist fallibilism	198
2	Newtonian methodology versus Newtonian method	201
a	Newton's problem: the clash between standards and achievements	201
b	Newtonians against metaphysical criticism	202
c	Newton's idea of experimental proof and its <i>credo quid absurdum</i>	208
d	Newtonians and factual criticism	214
e	Newton's double legacy	220
	<i>References</i>	223
	<i>Lakatos bibliography</i>	237
	<i>Indexes</i>	240