Contents

	List of Illustrations	ix
	Acknowledgments	xi
	Introduction	1
1.	Two Challenges to Rationalism	7
	 The Rationalist Image of Science 7 A Rationalist Model of Theory Evaluation 9 Aesthetic Factors in Discovery and Justification 12 The Boundaries of Scientific Behavior 16 A Precursor: Hutcheson's Account of Beauty in Science 17 	
2.	Abstract Entities and Aesthetic Evaluations	24
	 The Distinction between Theories and Their Representations 24 The Disregard of Abstract Entities by the Actor-Network Theory 26 Perceiving the Properties of Abstract Entities 28 Aesthetic Values, Properties, and Evaluations 29 Aesthetic Criteria and Canons 34 Identifying Which Properties of Theories Are Aesthetic 35 	
3.	The Aesthetic Properties of Scientific Theories	39
	 Classes of Aesthetic Properties 39 Form of Symmetry 41 Invocation of a Model 44 Visualization and Abstractness 48 Metaphysical Allegiance 54 Beauty in the Biological and Social Sciences 59 	

4.	Two Erroneous Views of Scientists' Aesthetic Judgments	61
	 The Theory of Aesthetic Disinterestedness 61 The Accord of Aesthetic and Empirical Judgments 64 Reductionism about Aesthetic and Empirical Judgments 67 	
5.	The Inductive Construction of Aesthetic Preference	70
	 Precepts and Their Warrants 70 The Warrant of Empirical Criteria 75 The Aesthetic Induction 77 The Conservatism of Aesthetic Canons 81 Fashions and Styles in Science 85 An Example of Scientific Style: Mechanicism 86 	
6.	The Relation of Beauty to Truth	90
	 Beauty as an Attribute of Truth 90 Aesthetic Judgment and the Recognition of Truth and Falsity 92 Einstein's Account of Theory Assessment 96 The Properties of Theories and the Properties of Phenomena 98 The Possible Success of the Aesthetic Induction 100 The Empirical Corroboration of Metaphysical World Views 102 	
7.	A Study of Simplicity	105
	 The Controversy about Scientists' Simplicity Judgments 105 Simplicity and the Unification of Phenomena 109 Degrees and Forms of Simplicity 111 Quantitative Definitions of Simplicity in Theory Choice 118 Simplicity, Beauty, and Truth 120 	
8.	Revolution as Aesthetic Rupture	125
	 The Occurrence of Scientific Revolutions 125 The Abandonment of Aesthetic Commitments 128 Continuity and Rupture in Revolutions 133 Understanding Past Science 135 Factors Inducing and Inhibiting Revolutions 137 The Analogy with Moral and Political Revolutions 139 	
9.	Induction and Revolution in the Applied Arts	141
	 Aesthetic Judgments and Utilitarian Performance 141 The Response of Architectural Design to Iron and Steel 142 The Use of Reinforced Concrete in Architecture 154 Materials and Forms in Industrial Design 157 	

10. Circles and Ellipses in Astronomy	163
 Testing the Model against History 163 Did Copernicus's Theory Constitute an Empirical Advance? 164 Copernicus's Return to Aristotelian Principles 168 The Aesthetic Preference for Copernicus's Theory 171 Kuhn's Account of the Acceptance of Copernicanism 17 The Iconoclasm of Kepler's Ellipses 177 	75
 Continuity and Revolution in Twentieth-Century Physi Two Flaws in Classical Physics 182 Aesthetic Factors in the Appeal of Relativity Theory 183 Quantum Theory and the Loss of Visualization 188 The Renunciation of Determinism 195 	
 Rational Reasons for Aesthetic Choices Review of Results 202 A Rational Warrant for Aesthetic Commitments 204 The Rationality of Revolutions 205 A Natural Inductive Disposition 207 	202
References Index	209 227