

Galileo Logic Of Discovery And Proof The Background Content And

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Explore the intricate logic of discovery employed by Galileo, analyzing the foundational proofs that shaped his revolutionary scientific contributions. This resource delves into the essential background content, providing critical context for understanding Galileo's methods and enduring impact on scientific thought.

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Galileo's Logic of Discovery and Proof

This volume is presented as a companion study to my translation of Galileo's MS 27, Galileo's Logical Treatises, which contains Galileo's appropriated questions on Aristotle's Posterior Analytics - a work only recently transcribed from the Latin autograph. Its purpose is to acquaint an English-reading audience with the teaching in those treatises. This is basically a sixteenth-century logic of discovery and of proof about which little is known in the present day, yet one that arguably guided the most significant research program of the seventeenth century. Despite its historical and systematic importance, the teaching is difficult to explain to the modern reader. Part of the problem stems from the fragmentary nature of the manuscript in which it is preserved, part from the contents of the teaching itself, which requires a considerable propaedeutic for its comprehension. A word of explanation is thus required to set out the structure of the volume and to detail the editorial decisions that underlie its organization. Two major manuscript studies have advanced the cause of scholarship on Galileo within the past two decades. The first relates to Galileo's experimental activity at Padua prior to his discoveries with the telescope that led to the publication of his Sidereus nuncius in 1610. Much of this activity has been uncovered by Stillman Drake in analyses of manuscript fragments associated with the composition of Galileo's Two New Sciences, fragments now bound in a codex identified as MS 72 in the collection of Galileiana at the Biblioteca Nazionale Centrale in Florence.

Rhetoric & Dialectic in the Time of Galileo

Examines the teaching and practice of the twin arts of argumentation -- rhetoric and dialectic -- in the time of Galileo. Galileo was an ardent controversialist on behalf of his astronomical theories, yet many today are unacquainted with the kinds of argument that became a focal point in his famous trial. The authors combine their vast knowledge of rhetoric, history, and philosophy to explain the background of the dispute between science and religion. They present an engaging discussion of the prevailing

modes of rhetorical and scientific arguments in Northern Italy during the Renaissance. They display primary texts on the arts of rhetoric and dialectic by authors whose thought was known to Galileo.

Byzantine and Renaissance Philosophy

Peter Adamson presents an engaging and wide-ranging introduction to two great intellectual cultures: Byzantium and the Italian Renaissance. First he tells the story of philosophy in the Eastern Christian world, from the 8th century to the 15th century, then he explores the rebirth of philosophy in Italy in the era of Machiavelli and Galileo.

Galileo and the Conflict between Religion and Science

For more than 30 years, historians have rejected what they call the 'warfare thesis' – the idea that there is an inevitable conflict between religion and science – insisting that scientists and believers can live in harmony. This book disagrees. Taking as its starting point the most famous of all such conflicts, the Galileo affair, it argues that religious and scientific communities exhibit very different attitudes to knowledge. Scripturally based religions not only claim a source of knowledge distinct from human reason. They are also bound by tradition, insist upon the certainty of their beliefs, and are resistant to radical criticism in ways in which the sciences are not. If traditionally minded believers perceive a clash between what their faith tells them and the findings of modern science, they may well do what the Church authorities did in Galileo's time. They may attempt to close down the science, insisting that the authority of God's word trumps that of any 'merely human' knowledge. Those of us who value science must take care to ensure this does not happen.

Galileo's Logical Treatises

Hard as it is to believe, what is possibly Galileo's most important Latin manuscript was not transcribed for the National Edition of his works and so has remained hidden from scholars for centuries. In this volume William A. Wallace translates the logical treatises contained in that manuscript and makes them intelligible to the modern reader. He prefaces his translation with a lengthy introduction describing the contents of the manuscript, the sources from which it derives, its dating, and how it relates to Galileo's other Pisan writings. The translation is accompanied by extensive notes and commentary; these explain the text and tie it to the fuller exposition of Galileo's logical methodology in the author's companion volume, *Galileo's Logic of Discovery and Proof*. The result is a research tool that is indispensable for anyone intent on understanding Galileo's logic as described in that volume and the documentary evidence on which it is based.

Between Copernicus and Galileo

Between Copernicus and Galileo is the story of Christoph Clavius, the Jesuit astronomer and teacher whose work helped set the standards by which Galileo's famous claims appeared so radical, and whose teachings guided the intellectual and scientific agenda of the Church in the central years of the Scientific Revolution. Though relatively unknown today, Clavius was enormously influential throughout Europe in the late sixteenth and early seventeenth centuries through his astronomy books—the standard texts used in many colleges and universities, and the tools with which Descartes, Gassendi, and Mersenne, among many others, learned their astronomy. James Lattis uses Clavius's own publications as well as archival materials to trace the central role Clavius played in integrating traditional Ptolemaic astronomy and Aristotelian natural philosophy into an orthodox cosmology. Although Clavius strongly resisted the new cosmologies of Copernicus and Tycho, Galileo's invention of the telescope ultimately eroded the Ptolemaic world view. By tracing Clavius's views from medieval cosmology the seventeenth century, Lattis illuminates the conceptual shift from Ptolemaic to Copernican astronomy and the social, intellectual, and theological impact of the Scientific Revolution.

Galileo

An entertaining, accessible biography of one of the greatest innovators ever known.

Galileo

An "intriguing and accessible" (Publishers Weekly) interpretation of the life of Galileo Galilei, one of history's greatest and most fascinating scientists, that sheds new light on his discoveries and how he was challenged by science deniers. "We really need this story now, because we're living

through the next chapter of science denial” (Bill McKibben). Galileo’s story may be more relevant today than ever before. At present, we face enormous crises—such as minimizing the dangers of climate change—because the science behind these threats is erroneously questioned or ignored. Galileo encountered this problem 400 years ago. His discoveries, based on careful observations and ingenious experiments, contradicted conventional wisdom and the teachings of the church at the time. Consequently, in a blatant assault on freedom of thought, his books were forbidden by church authorities. Astrophysicist and bestselling author Mario Livio draws on his own scientific expertise and uses his “gifts as a great storyteller” (The Washington Post) to provide a “refreshing perspective” (Booklist) into how Galileo reached his bold new conclusions about the cosmos and the laws of nature. A freethinker who followed the evidence wherever it led him, Galileo was one of the most significant figures behind the scientific revolution. He believed that every educated person should know science as well as literature, and insisted on reaching the widest audience possible, publishing his books in Italian rather than Latin. Galileo was put on trial with his life in the balance for refusing to renounce his scientific convictions. He remains a hero and inspiration to scientists and all of those who respect science—which, as Livio reminds us in this “admirably clear and concise” (The Times, London) book, remains threatened everyday.

The Cambridge Companion to Galileo

Not only a hero of the scientific revolution, but after his conflict with the church, a hero of science, Galileo is today rivalled in the popular imagination only by Newton and Einstein. But what did Galileo actually do, and what are the sources of the popular image we have of him? This 1998 collection of specially-commissioned essays is unparalleled in the depth of its coverage of all facets of Galileo’s work. A particular feature of the volume is the treatment of Galileo’s relationship with the church. It will be of interest to philosophers, historians of science, cultural historians and those in religious studies.

Novelties in the Heavens

In this fascinating work, Jean Dietz Moss shows how the scientific revolution begun by Copernicus brought about another revolution as well—one in which rhetoric, previously used simply to explain scientific thought, became a tool for persuading a skeptical public of the superiority of the Copernican system. Moss describes the nature of dialectical and rhetorical discourse in the period of the Copernican debate to shed new light on the argumentative strategies used by the participants. Against the background of Ptolemy’s *Almagest*, she analyzes the gradual increase of rhetoric beginning with Copernicus’s *De Revolutionibus* and Galileo’s *Siderius nuncius*, through Galileo’s debates with the Jesuits Scheiner and Grassi, to the most persuasive work of all, Galileo’s *Dialogue*. The arguments of the Dominicans Bruno and Campanella, the testimony of Johannes Kepler, and the pleas of Scriptural exegetes and the speculations of John Wilkins furnish a counterpoint to the writings of Galileo, the centerpiece of this study. The author places the controversy within its historical frame, creating a coherent narrative movement. She illuminates the reactions of key ecclesiastical and academic figures and the general public to the issues. Blending history and rhetorical analysis, this first study to look at rhetoric as defined by sixteenth- and seventeenth-century participants is an original contribution to our understanding of the use of persuasion as an instrument of scientific debate.

The Jesuits II

Accompanying DVD includes the opera *Patientis Christi memoria* by Johann Bernhard Staudt, performed in the chapel of St. Mary’s Hall, Boston College.

Hypotheses and Perspectives in the History and Philosophy of Science

To commemorate the 50th anniversary of his passing (in 2014), this special book features studies on Alexandre Koyré (1892–1964), one of the most influential historians of science of the 20th century, who re-evaluated prevalent thinking on the history and philosophy of science. In particular, it explores Koyré’s intellectual matrix and heritage within interdisciplinary fields of historical, epistemological and philosophical scientific thought. Koyré is rightly noted as both a versatile historian on the birth and development of modern science and for his interest in philosophical questions on the nature of scientific knowledge. In the 1940s and 1950s his activities in the United States established a crucial bridge between the European historical tradition of science studies and the American academic environments, and an entire generation of historians of science grew up under his direct influence. The book brings together contributions from leading experts in the field, and offers much-needed insights into the

subject from historical, nature of science, and philosophical perspectives. It provides an absorbing and revealing read for historians, philosophers and scientists alike.

The Impact of Aristotelianism on Modern Philosophy

The intelligibility of nature was a persistent theme of William A. Wallace, OP, one of the most prolific Catholic scholars of the late twentieth century. This Reader aims to make available a representative selection of his work in the history of science, natural philosophy, and theology illustrating his defense and development of this central theme. Wallace is among the most important Galileo scholars of the past fifty years and a key figure in the recent revival of scientific realism. Further, his long and productive scholarly career has been shaped by a continuous effort to bring the resources of the Aristotelian-Thomistic tradition to the solution of contemporary problems of philosophy and science. Through all of these contributions, Wallace has provided the foundation for a renewed confidence in the capacity of human knowers to attain understanding of the natural order. Consequently, the overall aim of this volume is to secure continued access to his scholarship for readers in the new millennium. The *Intelligibility of Nature* will contain twenty-nine previously published essays written by Wallace over a period of some forty years. Many of these essays are currently not readily accessible. They are arranged in five thematic groups, each representing a major subject-area of Wallace's scholarly interests. The first group is devoted to essays on making nature intelligible through the use of scientific models. The second group of essays investigates various ways in which the Aristotelian-Thomistic tradition is foundational to contemporary scientific research. Essays in the third group are historical studies on the origins of modern science. The fourth group of essays discuss the viability of the cosmological argument for the existence of God in light of natural science. The final group of essays consider the relation of science and religion. Together these essays provide a representative sample of Wallace's multifaceted contributions to scholarship.

Intelligibility of Nature

A reassessment of the Jesuit contributions to the emergence of the scientific worldview.

Jesuit Science and the Republic of Letters

The subject of this study is Husserl's theory of meaning as it appears in his writings from the *Logical Investigations* to the *Crisis of the European Sciences*. The first chapter focuses on Husserl's critique of psychologism and the theory of meaning that stems from it. The second chapter takes its departure from the question of Husserl's attitude towards the Cartesian tradition, then presents the transcendental (noematic) theory of meaning represented by *The Idea of Phenomenology*, *Ideas*, and *Cartesian Meditations*. The third chapter deals with Husserl's interpretation of time consciousness against the background of the development of the problem of time in modern philosophy. Husserl often changed his views regarding the question of meaning. I have tried to understand the reasons for these changes. To do this, I have occasionally disturbed the chronological order of his arguments in favour of a consideration of their logical development and coherence. Throughout this study, but especially in the digression on consciousness and speech and the Postscript, I have also attempted to bring to the fore a tension in Husserl's thought between two interpretive strategies: the first I call Cartesian, the other non-Cartesian or hermeneutical.

Logic and Time

This volume explores the reorganisation of knowledge taking place in the course of Galileo's research process extending over a period of more than thirty years, pursued within a network of exchanges with his contemporaries, and documented by a vast collection of research notes. It has revealed the challenging objects that motivated and shaped Galileo's thinking and closely followed the knowledge reorganization engendered by these challenges. It has thus turned out, for example, that the problem of reducing the properties of pendulum motion to the laws governing naturally accelerated motion on inclined planes was the mainspring for the formation of Galileo's comprehensive theory of naturally accelerated motion.

Swinging and Rolling

Quine is one of the twentieth century's most important and influential philosophers. The essays in this collection are by some of the leading figures in their fields and they touch on the most recent

turnings in Quine's work. The book also features an essay by Quine himself, and his replies to each of the papers. Questions are raised concerning Quine's views on knowledge: observation, holism, truth, naturalized epistemology; about language: meaning, the indeterminacy of translation, conjecture; and about the philosophy of logic: ontology, singular terms, vagueness, identity, and intensional contexts. Given Quine's preeminent position, this book must be of interest to students of philosophy in general, Quine aficionados, and most particularly to those working in the areas of epistemology, ontology, philosophies of language, of logic, and of science.

Knowledge, Language and Logic

This volume presents 15 studies occasioned by the 500th anniversary of the European discovery of America. It covers both the initial encounters between the Europeans and native Americans and the golden age of Hispanic philosophy that followed the discover

Hispanic Philosophy in the Age of Discovery

Although the Scientific Revolution has long been regarded as the beginning of modern science, there has been little consensus about its true character. While the application of mathematics to the study of the natural world has always been recognized as an important factor, the role of experiment has been less clearly understood. Peter Dear investigates the nature of the change that occurred during this period, focusing particular attention on evolving notions of experience and how these developed into the experimental work that is at the center of modern science. He examines seventeenth-century mathematical sciences—astronomy, optics, and mechanics—not as abstract ideas, but as vital enterprises that involved practices related to both experience and experiment. Dear illuminates how mathematicians and natural philosophers of the period—Mersenne, Descartes, Pascal, Barrow, Newton, Boyle, and the Jesuits—used experience in their argumentation, and how and why these approaches changed over the course of a century. Drawing on mathematical texts and works of natural philosophy from all over Europe, he describes a process of change that was gradual, halting, sometimes contradictory—far from the sharp break with intellectual tradition implied by the term "revolution."

Discipline and Experience

The Modeling of Nature provides an excellent introduction to the fundamentals of natural philosophy, psychology, logic, and epistemology.

The Modeling of Nature

The first full-scale demonstration of the centrality of the theory of signs to the history of philosophy, *Four Ages of Understanding* provides a new vantage point from which to review and reinterpret the development of intellectual culture at the threshold of "globalization."

Four Ages of Understanding

In *The Nature of the Book*, a tour de force of cultural history, Adrian Johns constructs an entirely original and vivid picture of print culture and its many arenas—commercial, intellectual, political, and individual. "A compelling exposition of how authors, printers, booksellers and readers competed for power over the printed page. . . . The richness of Mr. Johns's book lies in the splendid detail he has collected to describe the world of books in the first two centuries after the printing press arrived in England."—Alberto Manguel, *Washington Times* "[A] mammoth and stimulating account of the place of print in the history of knowledge. . . . Johns has written a tremendously learned primer."—D. Graham Burnett, *New Republic* "A detailed, engrossing, and genuinely eye-opening account of the formative stages of the print culture. . . . This is scholarship at its best."—Merle Rubin, *Christian Science Monitor* "The most lucid and persuasive account of the new kind of knowledge produced by print. . . . A work to rank alongside McLuhan."—John Sutherland, *The Independent* "Entertainingly written. . . . The most comprehensive account available . . . well documented and engaging."—Ian Maclean, *Times Literary Supplement*

The Nature of the Book

To provide a view of the history of western rhetoric, this volume presents original articles by a number of world-renowned scholars representing different countries and varying viewpoints. In discussing the status of the historical perspectives on rhetoric, these international scholars also present a tribute to

James J. Murphy, whose scholarship and service did much to shape the field. The book will introduce new insights into western European rhetoric and its connections with English rhetoric.

Rhetoric and Pedagogy

A “magisterial [and] elegantly written” study of Renaissance Italy’s remarkable accomplishments in higher education and academic research (Choice). Winner of the Howard R. Marraro Prize for Italian History from the American Historical Association Selected by Choice Magazine as an Outstanding Academic Title of the Year Italian Renaissance universities were Europe’s intellectual leaders in humanistic studies, law, medicine, philosophy, and science. Employing some of the foremost scholars of the time—including Pietro Pomponazzi, Andreas Vesalius, and Galileo Galilei—the Italian Renaissance university was the prototype of today’s research university. This is the first book in any language to offer a comprehensive study of this most influential institution. Noted scholar Paul F. Grendler offers a detailed and authoritative account of the universities of Renaissance Italy. Beginning with brief narratives of the origins and development of each university, Grendler explores such topics as the number of professors and their distribution by discipline; student enrollment (some estimates are the first attempted); famous faculty members; budgets and salaries; and relations with civil authority. He discusses the timetable of lectures, student living, foreign students, the road to the doctorate, and the impact of the Counter Reformation. He shows in detail how humanism changed research and teaching, producing the medical Renaissance of anatomy and medical botany, new approaches to Aristotle, and mathematical innovation. Universities responded by creating new professorships and suppressing older ones. The book concludes with the decline of Italian universities, as internal abuses and external threats—including increased student violence and competition from religious schools—ended Italy’s educational leadership in the seventeenth century.

The Universities of the Italian Renaissance

This book on medieval and early modern corpuscular matter theories presents the research results of nineteen scholars, who show that his modern model of matter has some of its roots in physical, medical, mathematical, alchemical, and theological conceptions developed in the Middle Ages.

The Cambridge History of Seventeenth-century Philosophy

Models of the History of Philosophy. From its Origins in the Renaissance to the ‘Historia philosophica’ (a translation of a work published in 1981 in Italian - the bibliography has been updated) gives a comprehensive description of the various forms and approaches in the literature of the history of philosophy from the fifteenth to the middle of the seventeenth century. Several traditions are described, from the well known ‘prisca theologia’ and ‘perennis philosophia’ traditions of Marsilio Ficino and Augustino Steuco, which claimed that the Greeks got their philosophy from the East, to the unknown influence of Scepticism on the history of philosophy by the recovery of Sextus Empiricus, and the German Protestant critical attack on Greek philosophy as Atheistic which was the tradition of the history of philosophy out of which Leibniz developed. Each individual historian of philosophy is given a separate entry which includes a biography, a complete bibliography of his works, a description of his history of philosophy and ends with both an assessment of his reputation during his own time and a complete listing of recent literature on him. As a result the substantial variety in the way the history of philosophy was written and, with it, an overview of the way western civilization developed is described in detail for the first time. For university history of literature, history of culture, history of religion and history of philosophy classes. The book can be used both for undergraduate courses (for specific reading assignments) and as background material for graduate courses. The bibliography provides important aids to many topics which have previously been almost inaccessible.

Late Medieval and Early Modern Corpuscular Matter Theories

Although highly influential, Brentano's doctrines from Psychology from an Empirical Standpoint were taken up and changed by his students and subsequent thinkers. Tassone's study of this important text offers readers a better understanding of PES and outlines its ongoing relevance for contemporary philosophy of mind.

Models of the History of Philosophy: From its Origins in the Renaissance to the ‘Historia Philosophica’

In this collection of essays Allan Franklin defends the view that science provides us with knowledge about the world which is based on experimental evidence and on reasoned and critical discussion. In short, he argues that science is a reasonable enterprise. He begins with detailed studies of four episodes from the history of modern physics: (1) the early attempts to detect gravity waves, (2) how the physics community decided that a proposed new elementary particle, 17-keV neutrino, did not exist, (3) a sequence of experiments on K meson decay, and (4) the origins of the Fifth Force hypothesis, a proposed modification of Newton's Law of Universal Gravitation. The case studies are then used to examine issues such as how discord between experimental results is resolved, calibration of an experimental apparatus and its legitimate use in validating an experimental result, and how experimental results provide reasonable grounds for belief in both the truth of physical theories and in the existence of the entities involved in those theories. This book is a challenge to the critics of science, both postmodern and constructivist, to provide convincing alternative explanations of the episodes and issues discussed. It should be of interest to philosophers, historians, and sociologists of science, and to scientists themselves.

From Psychology to Phenomenology

Leibniz's metaphysics of space and time stands at the centre of his philosophy and is one of the high-water marks in the history of the philosophy of science. In this work, Futch provides the first systematic and comprehensive examination of Leibniz's thought on this subject. In addition to elucidating the nature of Leibniz's relationalism, the book fills a lacuna in existing scholarship by examining his views on the topological structure of space and time, including the unity and unboundedness of space and time. It is shown that, like many of his more recent counterparts, Leibniz adopts a causal theory of time where temporal facts are grounded on causal facts, and that his approach to time represents a precursor to non-tensed theories of time. Futch then goes on to situate Leibniz's philosophy of space and time within the broader context of his idealistic metaphysics and natural theology. Emphasizing the historical background of Leibniz's thought, the book also places him in dialogue with contemporary philosophy of science, underscoring the enduring philosophical interest of Leibniz's metaphysics of time and space.

Can that be Right?

This anthology features essays and book excerpts on technology and values written by preeminent figures in the field from the early 20th century to the present. It offers an in-depth range of readings on important applied issues in technology as well. Useful in addressing questions on philosophy, sociology, and theory of technology Includes wide-ranging coverage on metaphysics, ethics, and politics, as well as issues relating to gender, biotechnology, everyday artifacts, and architecture A good supplemental text for courses on moral or political problems in which contemporary technology is a unit of focus An accessible and thought-provoking book for beginning and advanced undergraduates; yet also a helpful resource for graduate students and academics

Leibniz's Metaphysics of Time and Space

The Cambridge Companion to Renaissance Philosophy, published in 2007, provides an introduction to a complex period of change in the subject matter and practice of philosophy. The philosophy of the fourteenth through sixteenth centuries is often seen as transitional between the scholastic philosophy of the Middle Ages and modern philosophy, but the essays collected here, by a distinguished international team of contributors, call these assumptions into question, emphasizing both the continuity with scholastic philosophy and the role of Renaissance philosophy in the emergence of modernity. They explore the ways in which the science, religion and politics of the period reflect and are reflected in its philosophical life, and they emphasize the dynamism and pluralism of a period which saw both new perspectives and enduring contributions to the history of philosophy. This will be an invaluable guide for students of philosophy, intellectual historians, and all who are interested in Renaissance thought.

Technology and Values

The tension between art and science may be traced back to the Greeks. What became "natural philosophy" and later "science" has traditionally been posed as a fundamental alternative to poetry and art. It is a theme that has commanded central attention in Western thought, as it captures the ancient conflict of Apollo and Dionysus over what deserves to order our thought and serve as the aspiration of our cultural efforts. The modern schism between art and science was again clearly articulated in the

Romantic period and seemingly grew to a crescendo fifty years ago as a result of the debate concerning atomic power. The discussion has not abated in the physical sciences, and in fact has dramatically expanded most prominently into the domains of ecology and medicine. Issues concerning the role of science in modern society, although heavily political, must be regarded at heart as deeply embedded in our cultural values. Although each generation addresses them anew, the philosophical problems which lay at the foundation of these fundamental concerns always appear fresh and difficult. This anthology of original essays considers how science might have a greater commonality with art than was perhaps realized in a more positivist era. The contributors are concerned with how the aesthetic participates in science, both as a factor in constructing theory and influencing practice. The collection is thus no less than a spectrum of how Beauty and Science might be regarded through the same prism.

The Cambridge Companion to Renaissance Philosophy

The main theme of this anthology is the unique interaction between mathematics, physics and philosophy during the beginning of the 20th century. In this book, ten renowned philosopher-historians probe insightfully into key conceptual questions of pre-quantum mathematical physics. The result is a diverse yet thematically focused compilation of first class papers on mathematics, physics and philosophy, and a source-book on the interaction between them.

The Elusive Synthesis: Aesthetics and Science

This book is a historical-epistemological study of one of the most consequential breakthroughs in the history of celestial mechanics: Robert Hooke's (1635-1703) proposal to "compoun[d] the celestial motions of the planets of a direct motion by the tangent & an attractive motion towards a central body" (Newton, *The Correspondence* li, 297. Henceforth: *Correspondence*). This is the challenge Hooke presented to Isaac Newton (1642-1727) in a short but intense correspondence in the winter of 1679-80, which set Newton on course for his 1687 *Principia*, transforming the very concept of "the planetary heavens" in the process (Herivel, 301: *De Motu*, Version III). 1 It is difficult to overstate the novelty of Hooke's Programme • The celestial motions, it suggested, those proverbial symbols of stability and immutability, were in fact a process of continuous change: a deflection of the planets from original rectilinear paths by "a central attractive power" (*Correspondence*, li, 313). There was nothing necessary or essential in the shape of planetary orbits. Already known to be "not circular nor concentricall" (*ibid.*), Hooke claimed that these apparently closed "curve Line[s]" should be understood and calculated as mere effects of rectilinear motions and rectilinear attraction. And as Newton was quick to realize, this also implied that "the planets neither move exactly in ellipse nor revolve twice in the same orbit, so that there are as many orbits to a planet as it has revolutions" (Herivel, 301: *De Motu*, Version III).

Interactions

The sub-title of this symposium is accurate and, in a curious way, promises more than it states: Classical Physicist, Modern Philosopher. Heinrich Hertz, as the consummate experimentalist of 19th century technique and as brilliant clarifying critic of physical theory of his time, achieved one of the fulfillments but at the same time opened one of the transition points of classical physics. Thus, in his 'popular' lecture 'On the Relations Between Light and Electricity' at Heidelberg in the Fall of 1889, Hertz identified the ether as henceforth the most fundamental problem of physics, as the conceptual mystery but also the key to understanding mass, electricity, and gravity. Of Hertz's demonstration of electric waves, Helmholtz told the Physical Society of Berlin: "Gentlemen! I have to communicate to you today the most important physical discovery of the century." Hertz, philosophizing in his direct, lucid, pithy style, once wrote "We have to imagine". Perhaps this is metaphysics on the horizon? In the early pages of his *Principles of Mechanics*, we read A doubt which makes an impression on our mind cannot be removed by calling it metaphysical: every thoughtful mind as such has needs which scientific men are accustomed to denote as metaphysical. (PM23) And at another place, concerning the terms 'force' and 'electricity' and the alleged mystery of their natures, Hertz wrote: We have an obscure feeling of this and want to have things cleared up.

Meanest Foundations and Nobler Superstructures

This book deals with the development of thinking under different cultural conditions, focusing on the evolution of mathematical thinking in the history of science and education. Starting from Piaget's genetic

epistemology, it provides a conceptual framework for describing and explaining the development of cognition by reflective abstractions from systems of actions.

Heinrich Hertz: Classical Physicist, Modern Philosopher

Historians and philosophers of technology are searching for new approaches to the study of the interaction between science and technology. New conceptual frameworks are necessary since the idea that technology is simply applied science is nothing short of a myth. The papers contained in this volume deal primarily with cognitive and social aspects of the science-technology issue. One of the most salient features of these papers is that they show a major methodological shift in studying the interaction between science and technology. Discussions of the science-technology issue have long been dominated by the demarcation problem and related semantic issues about the notions 'science' and 'technology', and the 'technology is applied science' thesis. Instead of general 'global' interpretation schemes and models of the interaction between science and technology, detailed empirical case studies of cognitive and institutional connections between 'science' and 'technology' constitute the hard core of this book. The book will be of interest to philosophers of science, historians and philosophers of technology and science and sociologists of science.

Abstraction and Representation

Rationality of science was the topic of two conferences (held in 1988 and 1989) organized by the Department of Philosophy of Science, Institute of Philosophy, Jagiellonian University. Both conferences included a small group of invited speakers. This book contains a selection of papers presented there. It is intended mainly for specialists in the philosophy of science and scientists interested in philosophy. Students and especially postgraduate students would also benefit from reading it. The first conference, 'Popper, Polanyi and the Notion of Rationality', was held from 1 to 5 October 1988 in Janowice. The second conference, 'The Aim and Rationality of Science', was held in Cracow at the Jagiellonian University, from 4-10 June 1989. The topics of both conferences were inspired by our late friend Dr. Tomasz Kocowski, who many years earlier invited me and my colleagues from the Department to participate in research concerning the problem of creativity, and serve him and other psychologists as methodological advisors. Personal contacts with this intelligent and inquisitive man helped us to realize that we could not fulfill our task while adhering to the received view in the philosophy of science. This experience helped us to see science not only as scientific knowledge but also as a process of research. We then turned our attention to Michael Polanyi, who seemed to provide the philosophy we were looking for.

Technological Development and Science in the Industrial Age

The Problem of Rationality in Science and its Philosophy