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# **From Frege To Gödel A Source Book In Mathematical Logic 1879 1931 Source Books In History Of Sciences**

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Principia Mathematica and Related Systems Rails to  
Infinity Translations from the Philosophical Writings of  
Gottlob Frege Frege's Logic Labyrinth of Thought The  
Principles of Mathematics Revisited From Kant to  
Hilbert Volume 1 The Autonomy of Mathematical  
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Companion to Frege Frege and Gödel Politics, Logic,  
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Mathematical Logic Introduction to Mathematical Logic  
Reflections on Kurt Gödel The History of Philosophical  
and Formal Logic From Frege to Gödel The Great  
Formal Machinery Works With Trotsky in Exile Selected  
Essays Encyclopaedia of Mathematics, Supplement  
III Incompleteness: The Proof and Paradox of Kurt  
Gödel (Great Discoveries) From Frege to Gödel From  
Dedekind to Gödel The Search for Mathematical Roots,  
1870-1940 The Universal Computer Axiomatic Set  
Theory Essays on the Theory of Numbers

Van Heijenoort became a member of the exiled Trotsky's inner circle at the age of 20, following and living with Trotsky until his assassination in 1940. In 1948, van Heijenoort renounced Marxism and entered academia in the US. Feferman interviewed him over the course of three years and here recounts the events of his life and evolution of his thinking. Available from AK Peters, Ltd., 289 Linden Street, Wellesley, MA 02181. Annotation copyright by Book News, Inc., Portland, OR

## **A Logical Journey**

"José Ferreirós has written a magisterial account of the history of set theory which is panoramic, balanced, and engaging. Not only does this book synthesize much previous work and provide fresh insights and points of view, but it also features a major innovation, a full-fledged treatment of the emergence of the set-theoretic approach in mathematics from the early nineteenth century. This takes up Part One of the book. Part Two analyzes the crucial developments in the last quarter of the nineteenth century, above all the work of Cantor, but also Dedekind and the interaction between the two. Lastly, Part Three details the development of set theory up to 1950, taking account of foundational questions and the emergence of the modern axiomatization." (Bulletin of Symbolic Logic)

## **From Trotsky to Gödel**

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George Boolos was one of the most prominent and influential logician-philosophers of recent times. This collection, nearly all chosen by Boolos himself shortly before his death, includes thirty papers on set theory, second-order logic, and plural quantifiers; on Frege, Dedekind, Cantor, and Russell; and on miscellaneous topics in logic and proof theory, including three papers on various aspects of the Gödel theorems. Boolos is universally recognized as the leader in the renewed interest in studies of Frege's work on logic and the philosophy of mathematics. John Burgess has provided introductions to each of the three parts of the volume, and also an afterword on Boolos's technical work in provability logic, which is beyond the scope of this volume.

### **The Frege Reader**

Gathered together here are the fundamental texts of the great classical period in modern logic. A complete translation of Gottlob Frege's *Begriffsschrift*--which opened a great epoch in the history of logic by fully presenting propositional calculus and quantification theory--begins the volume, which concludes with papers by Herbrand and by Gödel.

### **An Introduction to Gödel's Theorems**

### **The Oxford Handbook of The History of Analytic Philosophy**

First English translation of revolutionary paper (1931)

that established that even in elementary parts of arithmetic, there are propositions which cannot be proved or disproved within the system. Introduction by R. B. Braithwaite.

## **The Routledge Handbook of Modality**

A portrait of the eminent twentieth-century mathematician discusses his theorem of incompleteness, relationships with such contemporaries as Albert Einstein, and untimely death as a result of mental instability and self-starvation.

## **Logic, Logic, and Logic**

## **Principia Mathematica**

Gottlob Frege (1848–1925) was unquestionably one of the most important philosophers of all time. He trained as a mathematician, and his work in philosophy started as an attempt to provide an explanation of the truths of arithmetic, but in the course of this attempt he not only founded modern logic but also had to address fundamental questions in the philosophy of language and philosophical logic. Frege is generally seen (along with Russell and Wittgenstein) as one of the fathers of the analytic method, which dominated philosophy in English-speaking countries for most of the twentieth century. His work is studied today not just for its historical importance but also because many of his ideas are still seen as relevant to current debates in the

philosophies of logic, language, mathematics and the mind. The Cambridge Companion to Frege provides a route into this lively area of research.

## **A Concise Introduction to Mathematical Logic**

Peter Smith examines Gödel's Theorems, how they were established and why they matter.

## **On Formally Undecidable Propositions of Principia Mathematica and Related Systems**

Mathematical logic developed into a broad discipline with many applications in mathematics, informatics, linguistics and philosophy. This text introduces the fundamentals of this field, and this new edition has been thoroughly expanded and revised.

## **Rails to Infinity**

The information age owes its existence to a little-known but crucial development, the theoretical study of logic and the foundations of mathematics. The Great Formal Machinery Works draws on original sources and rare archival materials to trace the history of the theories of deduction and computation that laid the logical foundations for the digital revolution. Jan von Plato examines the contributions of figures such as Aristotle; the nineteenth-century German polymath Hermann Grassmann; George Boole, whose Boolean logic would prove essential to

programming languages and computing; Ernst Schröder, best known for his work on algebraic logic; and Giuseppe Peano, cofounder of mathematical logic. Von Plato shows how the idea of a formal proof in mathematics emerged gradually in the second half of the nineteenth century, hand in hand with the notion of a formal process of computation. A turning point was reached by 1930, when Kurt Gödel conceived his celebrated incompleteness theorems. They were an enormous boost to the study of formal languages and computability, which were brought to perfection by the end of the 1930s with precise theories of formal languages and formal deduction and parallel theories of algorithmic computability. Von Plato describes how the first theoretical ideas of a computer soon emerged in the work of Alan Turing in 1936 and John von Neumann some years later. Shedding new light on this crucial chapter in the history of science, *The Great Formal Machinery Works* is essential reading for students and researchers in logic, mathematics, and computer science.

## **Translations from the Philosophical Writings of Gottlob Frege**

Newton/Descartes. Einstein/Gödel. The seventeenth century had its scientific and philosophical geniuses. Why shouldn't ours have them as well? Kurt Gödel was indisputably one of the greatest thinkers of our time, and in this first extended treatment of his life and work, Hao Wang, who was in close contact with Gödel in his last years, brings out the full subtlety of Gödel's ideas and their connection with grand themes

in the history of mathematics and philosophy. The subjects he covers include the completeness of elementary logic, the limits of formalization, the problem of evidence, the concept of set, the philosophy of mathematics, time, and relativity theory, metaphysics and religion, as well as general ideas on philosophy as a worldview. Wang, whose reflections on his colleague also serve to clarify his own philosophical thoughts, distinguishes his ideas from those of Gödel's and on points of agreement develops Gödel's views further. The book provides a generous array of information on and interpretation of the two main phases of Gödel's career - the years between 1924 and 1939 at the University of Vienna, which were marked by intense mathematical creativity, and the period from 1940 to his death in 1978, during which he was affiliated with the Institute for Advanced Studies in Princeton, a time in which Gödel's interests steadily shifted from questions of logic to metaphysics. And it also examines Gödel's relations with the Vienna Circle, his philosophical differences with Carnap and Wittgenstein, the intimate and mutually fruitful friendship with Einstein, and the periodic bouts of depression for which Gödel was hospitalized a number of times over the course of his life. Hao Wang is Professor of Logic at The Rockefeller University and author of scores of articles and several books on logic, computers, and philosophy, including *From Mathematics to Philosophy* (extensively discussed with Gödel and containing contributions by him) and *Beyond Analytic Philosophy: Doing Justice to What We Know* (MIT Press Bradford Books). He is currently preparing a companion volume, *Conversations with Kurt*

Gödel which will concentrate on Gödel's unpublished ideas. A Bradford Book.

## **Frege's Logic**

This study reconstructs, analyses and re-evaluates the programme of influential mathematical thinker David Hilbert, presenting it in a new light.

## **Labyrinth of Thought**

A monograph containing a historical introduction by A. A. Fraenkel to the original Zermelo-Fraenkel form of set-theoretic axiomatics, and Paul Bernays' independent presentation of a formal system of axiomatic set theory. No special knowledge of set theory and its axiomatics is required. With indexes of authors, symbols and matters, a list of axioms and an extensive bibliography.

## **The Principles of Mathematics Revisited**

### **From Kant to Hilbert Volume 1**

This volume, published on the fiftieth anniversary of Wittgenstein's death, brings together thirteen of Crispin Wright's most influential essays on Wittgenstein's later philosophies of language and mind, many hard to obtain, including the first publication of his Whitehead Lectures given at Harvard in 1996. Organized into four groups, the essays focus on issues about following a rule and the

objectivity of meaning; on Saul Kripke's contribution to the interpretation of Wittgenstein; on privacy and self-knowledge; and on aspects of Wittgenstein's philosophy of mathematics. Wright uses the cutting edge of Wittgenstein's thought to expose and undermine the common assumptions in platonistic views of mathematical and logical objectivity and Cartesian ideas about self-knowledge. The great question remains: How to react to the demise of these assumptions? In response, the essays develop a concerted, evolving approach to the possibilities--and limitations--of constructive philosophies of mathematics and mind. Their collection constitutes a major statement by one of Britain's most important philosophers--and will provide an indispensable tool both for students of Wittgenstein and for scholars working more generally in the metaphysics of mind and language.

## **The Autonomy of Mathematical Knowledge**

This is an expansion of the author's 1991 work which investigates the implications of Gödel's writings on Einstein's theory of relativity as they relate to the fundamental questions of the nature of time and the possibilities for time travel.

## **A World Without Time**

First published in 2005. Routledge is an imprint of Taylor & Francis, an informa company.

## **The Cambridge Companion to Frege**

Winner of a CHOICE Outstanding Academic Title Award for 2011! This book offers an introduction to modern ideas about infinity and their implications for mathematics. It unifies ideas from set theory and mathematical logic, and traces their effects on mainstream mathematical topics of today, such as number theory and combinatorics. The treatment is historical and partly informal, but with due attention to the subtleties of the subject. Ideas are shown to evolve from natural mathematical questions about the nature of infinity and the nature of proof, set against a background of broader questions and developments in mathematics. A particular aim of the book is to acknowledge some important but neglected figures in the history of infinity, such as Post and Gentzen, alongside the recognized giants Cantor and Gödel.

## **Frege and Gödel**

This is the first single-volume edition and translation of Frege's philosophical writings to include all of his seminal papers and substantial selections from all three of his major works.

## **Politics, Logic, and Love**

## **Wittgenstein**

This book, written by one of philosophy's pre-eminent

logicians, argues that many of the basic assumptions common to logic, philosophy of mathematics and metaphysics are in need of change. It is therefore a book of critical importance to logical theory. Jaakko Hintikka proposes a new basic first-order logic and uses it to explore the foundations of mathematics. This new logic enables logicians to express on the first-order level such concepts as equicardinality, infinity, and truth in the same language. The famous impossibility results by Gödel and Tarski that have dominated the field for the last sixty years turn out to be much less significant than has been thought. All of ordinary mathematics can in principle be done on this first-order level, thus dispensing with the existence of sets and other higher-order entities.

## **Roads to Infinity**

The History of Philosophical and Formal Logic introduces ideas and thinkers central to the development of philosophical and formal logic. From its Aristotelian origins to the present-day arguments, logic is broken down into four main time periods: Antiquity and the Middle Ages (Aristotle and The Stoics) The early modern period (Bolzano, Boole) High modern period (Frege, Peano & Russell and Hilbert) Early 20th century (Gödel and Tarski) Each new time frame begins with an introductory overview highlighting themes and points of importance. Chapters discuss the significance and reception of influential works and look at historical arguments in the context of contemporary debates. To support independent study, comprehensive lists of primary

and secondary reading are included at the end of chapters, along with exercises and discussion questions. By clearly presenting and explaining the changes to logic across the history of philosophy, *The History of Philosophical and Formal Logic* constructs an easy-to-follow narrative. This is an ideal starting point for students looking to understand the historical development of logic.

## **Foundations of Mathematical Logic**

Hao Wang (1921-1995) was one of the few confidants of the great mathematician and logician Kurt Gödel. *A Logical Journey* is a continuation of Wang's *Reflections on Gödel* and also elaborates on discussions contained in *From Mathematics to Philosophy*. A decade in preparation, it contains important and unfamiliar insights into Gödel's views on a wide range of issues, from Platonism and the nature of logic, to minds and machines, the existence of God, and positivism and phenomenology. The impact of Gödel's theorem on twentieth-century thought is on par with that of Einstein's theory of relativity, Heisenberg's uncertainty principle, or Keynesian economics. These previously unpublished intimate and informal conversations, however, bring to light and amplify Gödel's other major contributions to logic and philosophy. They reveal that there is much more in Gödel's philosophy of mathematics than is commonly believed, and more in his philosophy than his philosophy of mathematics. Wang writes that "it is even possible that his quite informal and loosely structured conversations with me, which I am freely

using in this book, will turn out to be the fullest existing expression of the diverse components of his inadequately articulated general philosophy." The first two chapters are devoted to Gödel's life and mental development. In the chapters that follow, Wang illustrates the quest for overarching solutions and grand unifications of knowledge and action in Gödel's written speculations on God and an afterlife. He gives the background and a chronological summary of the conversations, considers Gödel's comments on philosophies and philosophers (his support of Husserl's phenomenology and his digressions on Kant and Wittgenstein), and his attempt to demonstrate the superiority of the mind's power over brains and machines. Three chapters are tied together by what Wang perceives to be Gödel's governing ideal of philosophy: an exact theory in which mathematics and Newtonian physics serve as a model for philosophy or metaphysics. Finally, in an epilog Wang sketches his own approach to philosophy in contrast to his interpretation of Gödel's outlook.

## **Introduction to Mathematical Logic**

The main stream of academic philosophy, in Anglophone countries and increasingly worldwide, is identified by the name 'analytic'. The study of its history, from the 19th century to the late 20th, has boomed in recent years. These specially commissioned essays by forty leading scholars constitute the most comprehensive book on the subject.

## **Reflections on Kurt Gödel**

### **The History of Philosophical and Formal Logic**

This two-volume work brings together a comprehensive selection of mathematical works from the period 1707-1930. During this time the foundations of modern mathematics were laid, and *From Kant to Hilbert* provides an overview of the foundational work in each of the main branches of mathematics with narratives showing how they were linked. Now available as a separate volume.

### **From Frege to Gödel**

The breathtakingly rapid pace of change in computing makes it easy to overlook the pioneers who began it all. Written by Martin Davis, respected logician and researcher in the theory of computation, *The Universal Computer: The Road from Leibniz to Turing* explores the fascinating lives, ideas, and discoveries of seven remarkable mathematicians. It tells the stories of the unsung heroes of the computer age – the logicians. The story begins with Leibniz in the 17th century and then focuses on Boole, Frege, Cantor, Hilbert, and Gödel, before turning to Turing. Turing's analysis of algorithmic processes led to a single, all-purpose machine that could be programmed to carry out such processes—the computer. Davis describes how this incredible group, with lives as extraordinary as their accomplishments,

grappled with logical reasoning and its mechanization. By investigating their achievements and failures, he shows how these pioneers paved the way for modern computing. Bringing the material up to date, in this revised edition Davis discusses the success of the IBM Watson on Jeopardy, reorganizes the information on incompleteness, and adds information on Konrad Zuse. A distinguished prize-winning logician, Martin Davis has had a career of more than six decades devoted to the important interface between logic and computer science. His expertise, combined with his genuine love of the subject and excellent storytelling, make him the perfect person to tell this story.

## **The Great Formal Machinery Works**

Modality - the question of what is possible and what is necessary - is a fundamental area of philosophy and philosophical research. The Routledge Handbook of Modality is an outstanding reference source to the key topics, problems and debates in this exciting subject and is the first collection of its kind.

Comprising thirty-five chapters by a team of international contributors the Handbook is divided into seven clear parts: worlds and modality essentialism, ontological dependence, and modality modal anti-realism epistemology of modality modality in science modality in logic and mathematics modality in the history of philosophy. Within these sections the central issues, debates and problems are examined, including possible worlds, essentialism, counterfactuals, ontological dependence, modal

fictionalism, deflationism, the integration challenge, conceivability, a priori knowledge, laws of nature, natural kinds, and logical necessity. The Routledge Handbook of Modality is essential reading for students and researchers in epistemology, metaphysics and philosophy of language. It will also be very useful for those in related fields in philosophy such as philosophy of mathematics, logic and philosophy of science.

## **With Trotsky in Exile**

For many philosophers, modern philosophy begins in 1879 with the publication of Frege's *Begriffsschrift*, in which Frege presents the first truly modern logic in his symbolic language, *Begriffsschrift*, or concept-script. Macbeth's book, the first full-length study of this language, offers a highly original new reading of Frege's logic based directly on Frege's own two-dimensional notation and his various writings about logic.

## **Selected Essays**

In 1942, the logician Kurt Godel and Albert Einstein became close friends; they walked to and from their offices every day, exchanging ideas about science, philosophy, politics, and the lost world of German science. By 1949, Godel had produced a remarkable proof: In any universe described by the Theory of Relativity, time cannot exist. Einstein endorsed this result reluctantly but he could find no way to refute it, since then, neither has anyone else. Yet cosmologists

and philosophers alike have proceeded as if this discovery was never made. In *A World Without Time*, Palle Yourgrau sets out to restore Gödel to his rightful place in history, telling the story of two magnificent minds put on the shelf by the scientific fashions of their day, and attempts to rescue the brilliant work they did together.

## **Encyclopaedia of Mathematics, Supplement III**

### **Incompleteness: The Proof and Paradox of Kurt Gödel (Great Discoveries)**

#### **From Frege to Gödel**

This story of a highly intelligent observer of the turbulent 20th century who was intimately involved as the secretary and bodyguard to Leon Trotsky is based on extensive interviews with the subject, Jean van Heijenoort, and his family, friends, and colleagues. The author has captured the personal drama and the professional life of her protagonist--ranging from the political passion of a young intellectual to the scientific and historic work in the most abstract and yet philosophically important area of logic--in a very readable narrative.

#### **From Dedekind to Gödel**

Written by a pioneer of mathematical logic, this

comprehensive graduate-level text explores the constructive theory of first-order predicate calculus. It covers formal methods — including algorithms and epistheory — and offers a brief treatment of Markov's approach to algorithms. It also explains elementary facts about lattices and similar algebraic systems. 1963 edition.

## **The Search for Mathematical Roots, 1870-1940**

Gathered together here are the fundamental texts of the great classical period in modern logic. A complete translation of Gottlob Frege's *Begriffsschrift*--which opened a great epoch in the history of logic by fully presenting propositional calculus and quantification theory--begins the volume, which concludes with papers by Herbrand and by Gödel.

## **The Universal Computer**

While many books have been written about Bertrand Russell's philosophy and some on his logic, I. Grattan-Guinness has written the first comprehensive history of the mathematical background, content, and impact of the mathematical logic and philosophy of mathematics that Russell developed with A. N. Whitehead in their *Principia mathematica* (1910-1913). This definitive history of a critical period in mathematics includes detailed accounts of the two principal influences upon Russell around 1900: the set theory of Cantor and the mathematical logic of Peano and his followers. Substantial surveys

are provided of many related topics and figures of the late nineteenth century: the foundations of mathematical analysis under Weierstrass; the creation of algebraic logic by De Morgan, Boole, Peirce, Schröder, and Jevons; the contributions of Dedekind and Frege; the phenomenology of Husserl; and the proof theory of Hilbert. The many-sided story of the reception is recorded up to 1940, including the rise of logic in Poland and the impact on Vienna Circle philosophers Carnap and Gödel. A strong American theme runs through the story, beginning with the mathematician E. H. Moore and the philosopher Josiah Royce, and stretching through the emergence of Church and Quine, and the 1930s immigration of Carnap and Gödel. Grattan-Guinness draws on around fifty manuscript collections, including the Russell Archives, as well as many original reviews. The bibliography comprises around 1,900 items, bringing to light a wealth of primary materials. Written for mathematicians, logicians, historians, and philosophers--especially those interested in the historical interaction between these disciplines--this authoritative account tells an important story from its most neglected point of view. Whitehead and Russell hoped to show that (much of) mathematics was expressible within their logic; they failed in various ways, but no definitive alternative position emerged then or since.

## **Axiomatic Set Theory**

Discussions of the foundations of mathematics and their history are frequently restricted to logical issues

in a narrow sense, or else to traditional problems of analytic philosophy. From Dedekind to Gödel: Essays on the Development of the Foundations of Mathematics illustrates the much greater variety of the actual developments in the foundations during the period covered. The viewpoints that serve this purpose included the foundational ideas of working mathematicians, such as Kronecker, Dedekind, Borel and the early Hilbert, and the development of notions like model and modelling, arbitrary function, completeness, and non-Archimedean structures. The philosophers discussed include not only the household names in logic, but also Husserl, Wittgenstein and Ramsey. Needless to say, such logically-oriented thinkers as Frege, Russell and Gödel are not entirely neglected, either. Audience: Everybody interested in the philosophy and/or history of mathematics will find this book interesting, giving frequently novel insights.

## **Essays on the Theory of Numbers**

This is the third supplementary volume to Kluwer's highly acclaimed twelve-volume Encyclopaedia of Mathematics. This additional volume contains nearly 500 new entries written by experts and covers developments and topics not included in the previous volumes. These entries are arranged alphabetically throughout and a detailed index is included. This supplementary volume enhances the existing twelve volumes, and together, these thirteen volumes represent the most authoritative, comprehensive and up-to-date Encyclopaedia of Mathematics available.

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