

## Analytic Contents

*Magyar*: Hungarian, Magyar

*magyarázni*: to explain

*Introduction: Who Was Imre Lakatos? Ki volt Lakatos Imre?*

There are two Lakatoses. One is the outstanding successor of Karl Popper, editor of the *British Journal for the Philosophy of Science* at the time of his death and key participant in the Anglo-American philosophy of science debates of the 1960s and 1970s. The other is a Hegelian who covertly introduced innovative ideas about history, reason, and criticism into Anglo-American philosophy. This combined dual philosophy makes reading Lakatos analogous to the 1920s' reading by Georg Lukács' in *History and Class Consciousness* of the buried yet substantive Hegelian architectonic in Karl Marx. The problem here is not that of understanding Lakatos but rather his marvelous philosophical, historical, and cross-cultural achievements. Several themes in Lakatos's work suggest an interpretation of his dual philosophy against the perverse irrationalism of Hungarian Stalinism between World War II and the emergence of the failed 1956 Hungarian Revolution.

*Part 1 A Mathematical Bildungsroman*

*1. The Mathematical Present as History*

Lakatos's *Proofs and Refutations* is an unusual combination of mathematical history and an analysis of numerous nineteenth-century proofs of Leonhard Euler's theorem about polyhedra. Lakatos metaphorically describes his complex narrative technique using Ernst Haeckel's "biogenetic law" that "ontogeny recapitulates phylogeny," also a shorthand for Hegel's historiographical technique in *The Phenomenology of Spirit*. The strange historiography is Lakatos's means for devising a historical and fallible account of modern techniques of mathematical proof. He identifies formalism—meaning the complete identification of mathematics with some formalized, metamathematical representative—as the philosophical perspective he intends to challenge through his history.

Lakatos develops a theory of mathematical heuristic, or a proof pedagogy, through a history of nineteenth-century mathematics and contemporary formalism, analogous to Hegel's approach to constructing an exoteric and learnable philosophical method by summarizing historical patterns of knowledge. The bildungsroman genre, created by Johann Wolfgang von Goethe in his *Wilhelm Meister* novels, contains several of the main narrative techniques used both in the *Phenomenology* and *Proofs and Refutations* to present rationality as a process of self-formative learning through error. The "hero" of *Proofs and Refutations* is Euler's theorem, whose historical odyssey is analogous to that of the generic learning consciousness in the *Phenomenology* and Wilhelm's *Lehrjahre*. Hegel's polemical attack against the antipedagogical and aristocratic epistemology he found in Friedrich Schelling's intellectual intuition, against which the *Phenomenology* is positioned, will be repeated by Lakatos in his critique of the Euclidean-deductivist style in mathematical texts. Schelling's irrationalism will provide a route later back to Lakatos's Hungary via Lukács's views on Hegel and the origins of modern irrationalism described in Lukács's 1954 *The Destruction of Reason*.

### 2. *The Method of Proofs and Refutations*

Theorems for Lakatos are conjectures, and an informal proof is a thought experiment or decomposition of a mathematical conjecture into subconjectures, then organized as a series of lemmas that explain the truth of the conjecture. As well as much else, *Proofs and Refutations* explores the relationship between the improvement of informal proofs in history and traditional logical justification, truth, and falsity. The technique Lakatos calls "lemma-incorporation," reformulated as the method of proofs and refutations, is the engine for these interactions. For Lakatos, the method of proofs and refutations is a historical innovation of mid-nineteenth-century mathematics through which rigor is improved as theorems become wedded to the mathematical objects they are about. His account of the coupling between mathematical objects and the theorems describing them is a version of Hegel's so-called phenomenological criticism, being the historiographical method of the *Phenomenology*. Lakatos's history of the method of proofs and refutations gives a reasonable portrayal of major methodological problems raised by nineteenth-century mathematics, culminating with Georg Cantor's development of point set theory through his work on trigonometric series.

### 3. *Mathematical Skepticism*

Lakatos attributes the foundational crisis in mathematics at the start of the twentieth century, in part, to the skeptical power inherent in the method of

proofs and refutations. This is consistent with Hegel's phenomenological method as a historiographical reformulation of central Pyrrhonian skeptical tropes. The principal differences between classical Pyrrhonism and Hegel's and Lakatos's transmogrifications are the goals to which skeptical criticism leads. Lakatos explains mathematical fallibilism as a species of mitigated skepticism in which its radical and destructive side is tempered for the sake of mathematical progress.

#### 4. *Between Formal and Informal*

Lakatos expresses the contemporary relationship between formal and informal proofs as a problem of fallible translation. The heuristics underlying Kurt Gödel's incompleteness theorems, considered as informal mathematical theorems, illustrate the translation process and skepticism in modern mathematics. A history of "monster-barring" and lemma incorporation for Gödel's second incompleteness theorem supports Lakatos's ideas on translation within metamathematics as informal mathematical practice. Gödel's proof, therefore, proves that it is itself a piece of informal and historical mathematics.

#### 5. *Reason Inverted*

Lakatos criticizes the Euclidean-deductivist style found in many mathematics texts as concealing the heuristic logic underlying their proofs. Appeals to mathematical intuition found in such accounts play the role of Schelling's elitist intuitionism, which Hegel wanted to prevent through his historical pedagogy. In this way, the Euclidean-deductivist style promotes a specifically Hegelian species of irrationalism. The ancient Greek method of analysis-synthesis and the history of concealed proofs both provide precedents for the means by which the heuristic logic of proofs and refutations is concealed in traditional deductive proofs. Marx described a similar inversion of historical development and logical exposition for his economic historiography. The foundation for articulated history and heuristic, as the opposite of inarticulate and irrationalist intuitions as a source of knowledge, is the autonomy of natural language as adopted by Lakatos through Popper's "objective knowledge," but is also found in Hegel's conception of language as the essential medium for cultural *Bildung*.

### Part 2 *A Changing Logic of Scientific Discovery*

#### 6. *Kuhn, Popper, Feyerabend, Lakatos*

A principal lesson of the philosophy of science debates of the 1960s and 1970s is the central role for history in understanding scientific method.

Lakatos makes historiographical problems his main philosophical theme, combined with strong normative claims about how the criticism and appraisal of scientific theories ought to proceed.

### *7. A Historiographical Toolkit*

Rather than using a single theory confronting observations as his unit of analysis, Lakatos uses series of theories changing in time and placed within the larger context of competing research programmes. Applications of the methodology of scientific research programmes by Lakatos and his students are summarized, including accounts of the early wave theory of light, oxygen and phlogiston, the phenomenological and kinetic theories of heat, Copernican and Ptolemaic astronomy, and the special theory of relativity. The latter two studies show the problems faced by the methodology of scientific research programmes in explaining truly revolutionary science.

### *8. Contradiction and Hindsight*

Lakatos's two strongest criticisms of Popper are those associated with the role of contradictions in scientific theories and the difficulties in specifying crucial falsifying experiments in advance of conducting them and interpreting the results. Lakatos argues that contradictions are ubiquitous and do not by themselves provide grounds for theory rejection. Theory rejection also occurs often with historical hindsight and the reinterpretation of experiments provided by theories not available when the experiments were conducted. Niels Bohr's early quantum theory provides Lakatos's main evidence for his claims about contradictions. The Michelson-Morley experiments on the ether and speed of light, and their role in the genesis of relativity theory, provide support for the role of hindsight.

### *9. Reason in History*

After developing his theory of research programmes as a critique of Popper and applying it through several case studies, Lakatos makes the topic of historical reconstruction explicit. Philosophies of science become historiographical theories by characterizing just what in history was science. Likewise, any history of science contains an implicit normative methodology of how science proceeded. All history of science is theory laden by some methodological theory to define its "internal" core abstracted from who created it and under what material or social conditions. "External" history is used to explain the actual historical conditions through which the internal content appeared. Lakatos's principal historiographical distinctions and

claims about the theory ladenness of historical inquiry occur explicitly in Hegel's historiographical discussions.

### 10. *A Changing Logic*

Lakatos creates his historiographical theory via a self-application of the theory of research programmes to its own emergence in the philosophy of science. A similar skeptical argument was deployed by Lukács in *History and Class Consciousness* to argue for the changing historical status of Marxist theory. With Lakatos, self-application also leads to a changing logic of scientific discovery and completes his Hegelian vision. Lakatos's historiographical theory, moreover, turns his descriptions of scientific progress into normative tools for characterizing scientific progress and degeneration.

### 11. *Classical Political Economy as a Research Programme*

The long-standing question of the scientific status of Marxian economics is answered in the affirmative for the research programme that Marx conceived his work to belong to—namely, the tradition of classical political economy, and the work of Adam Smith and David Ricardo. Marxian economics does not grow into a progressive research programme but Marxian economics nonetheless qualifies as a research programme and hence is “scientific.” Thus, Lakatos implicitly settles the problem of reconciling the two Marxes: one the historicizing social theorist and son of Hegel; the other the nineteenth-century contributor to scientific political economy.

## Part 3 *Magyarország/Hungary*

### 12. *Hungary 1956 and the Inverted World*

From the end of World War II until 1956, Hungarians lived a veritable life of lies in which dissemblance, surveillance, paranoia, fear, and the falsification of political life and history permeated social interactions and cultural life. The essence of Stalinism was the personality cult, centered in Hungary on Mátyás Rákosi. Many writers and other leading intellectuals became elite Stalinists, contributing their skills to perpetuating Hungary's domination from within by Soviet rule. Ritual practices of self-criticism and pseudo-dialectics completed the perversion of Hegelian-Marxian reason. Stalin's death in 1953 and the release of thousands of political prisoners led to a slow awakening and turnabout of Stalinist intellectuals against the Rákosi regime. The standard history of 1956 views the revolution as based in demands

for the right to truth, meaning not having to lead a dissembled life in a society that had effectively lost workable conceptions of truth and falsity.

Lakatos was a charismatic and treacherous member of the Communist underground during World War II, after which he worked and studied with Lukács. A political operative in league with some of the highest members of the Stalinist government, Lakatos wrote ideological criticism and conducted disruptive infiltration work at Budapest's distinguished Eötvös College, helping to bring about its downfall. Yet, caught up in Rákosi's purges, Lakatos was imprisoned during Hungary's "Ice Age" in the infamous Reesk forced labor camp. After his release, he eventually made an about-face like other Stalinist intellectuals. His speeches at the important Petőfi Circle debates in the fall of 1956 on educational topics anticipates his later views on scientific criticism and objectivity. Lakatos was a classic Hungarian Stalinist intellectual of the postwar era.

Lukács's *The Destruction of Reason* contains an implicit critique of the Stalinist personality cult via the book's account of Hegel's attack on Schelling's intuitionism. Shortly before he died, Lakatos parroted Lukács's ideas in polemical attacks, suggesting comparisons between his own conceptions of irrationalism and Stalinist Hungary. The latter appears as a ghastly irrationalist perversion both of Hegelian-Marxism and Lakatos's historicist rationality. Lakatos's philosophy provides a window into this macabre world, warning of the power and dangers manifested by several guises of reason.