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Editors

The Logical Writings of Karl Popper

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Karl Popper at Aoraki / Mount Cook, New Zealand in May 1945.

Preface

Although Karl Popper was one of the outstanding philosophers of the twentieth century, his writings on deductive logic are little known. They deserve to be known better: not only historically as part of the work of a great philosopher of science, but also systematically as a significant contribution to the debate on the foundations of logic. Here Popper advocates a view of logic which in more modern terms would be called "inferentialist" (he himself spoke of "inferential definitions" of logical signs). He developed this view of logic during his time in New Zealand (1937–1945) and afterwards in London[1], and published his results in a series of articles in the late 1940s. This work is far more than a by-product. After the composition of *The Open Society and Its Enemies* in 1940–1942 (Popper, 1945a)[2], which upon its publication in 1945 established Popper's fame as a social and political philosopher, he spent most of his research time during the following years on formal logic. His articles of 1947–1949 were written "with much enthusiasm"[3], and one can well imagine that Popper would have continued these investigations, had they found a better reception in the logic community at the time. Popper even planned to write a textbook on

[1] The frontispiece on the left shows a photograph of Popper taken during a holiday trip to Aoraki / Mount Cook, New Zealand, in May 1945. On the trip back he received a cable from Friedrich Hayek notifying him that the appointment committee of the London School of Economics and Political Science (LSE) had decided positively on his application for a readership in logic and scientific method, which shaped Popper's future career; cf. Dahrendorf (1995, pp. 422-427) and Hacohen (2002, p. 499).

[2] Together with *The Poverty of Historicism* (Popper, 1944a,b, 1945b); cf. Popper's letter to Carnap of 15 October 1942 (this volume, § 23.1).

[3] Cf. Popper (1974b, p. 1095, this volume, § 12, p. 217). This is confirmed by a circular of his wife Hennie, of Easter 1947, to a range of New Zealand friends in which she describes "his recent occupation with the salvation of logic" (Hennie Popper, 1947a): "He returned and simply dived back into his logic, saying only sh-sh-sh-sh and do you think one could type this sign on the typewriters? And there was a meeting of some biologists in London, and he went there for the whole day and came back at night late and returned again to his papers. He is terribly excited about it and says he is finding all sorts of simplifications and it's getting simpler and simpler, and more and more interesting! And it just absorbs him completely.". Brian Boyd has kindly pointed us to this passage.

elementary logic, as a remark in a letter to John C. Eccles of 10 November 1946 shows.[4]

Popper's writings on logic were reviewed by prominent mathematical logicians, and many other logicians and philosophers knew his papers or were at least aware of their existence, as occasional references show. Nevertheless, the overall consideration of this work as a philosophically significant contribution to formal logic and to the foundations of deductive reasoning was limited – something that remains the case today. To improve this situation, our idea was to produce an edition which allows the reader easy access to Popper's logical works, which at the same time is sufficiently comprehensive to cover most aspects of what we consider to be their essence.

The central part of this collection are the six articles published in 1947–1949 on the foundations of deductive logic (Chapters 2–7). They are also the topic of our introduction to Popper's inferentialist conception of logic (Chapter 1). These articles are accompanied by a short note of 1943 (Chapter 8). This note deals with negation in a manner that shows traces of what would be fully developed in the later articles, and which is interesting from the point of view of modern discussions on paraconsistent logics, the ex falso rule and disjunctive syllogism. These articles are furthermore accompanied by three later papers written in the 1950s, which exemplify that Popper continued to be interested in logic, although not primarily from the inferentialist perspective. Chapter 9 shows Popper's abiding interest in Tarski's work, here in the definitions of satisfaction and truth in contradistinction to logical consequence, which is the basis of the inferentialist approach. Chapter 10 takes up a discussion of the liar paradox by Fitch, arguing that declaring a liar sentence to be neither true nor false does not escape paradoxicality. Chapter 11 discusses the subjunctive conditional, which plays a significant role in philosophy of science when it comes to the meaning of natural laws. Chapter 12 is reproduced from Schilpp (1974) and presents Popper's reply to Lejewski (1974), who had dealt with Popper's inferential approach to logic. This reply contains many interesting comments on the background to Popper's development of his inferentialist approach. In Chapter 13 we reprint the reviews of Popper's articles on logic. These were written by renowned logicians, and some of them were very critical of Popper's approach, both for conceptual reasons and for reasons of technical exposition. We doubt, however, that these reviews were the reason for the poor reception of Popper's logical works then and now. Even the most critical of these reviews left open the possibility to pursue certain basics of Popper's works in revised forms. We would rather claim that Popper's inferentialism as well as his extensive discussion of dualities and non-classical negations (beyond just intuitionism) was too much ahead of its time. Inferentialism, proof-theoretic semantics and corresponding theories of meaning, apart from their implicit presence

[4] Popper (1946b); communicated to us by Brian Boyd. Cf. also Popper's (1946a) draft of a letter to Alexander Carr-Saunders, the then director of the LSE, in which he writes: "I may say that I am at present preparing a textbook on formal logic, not because I like writing a textbook (it interferes, on the contrary, badly with my own research programme) but because I find it necessary for my students. The existing textbooks have aims totally different from what I consider to be the aim of a modern introductory course in Logic.". A table of contents with possible titles for such a textbook can be found in Popper's Nachlass (KPS Box 371, Folder 1).

in the work of Gentzen, became prominent only in the late 1960s in the aftermath of Prawitz's (1965) interpretation of natural deduction and the establishment of a general proof theory that made the structure of proofs and inferences a topic of philosophical interest.

The second part of this volume presents a number of manuscripts from Popper's Nachlass, which are related to the published papers. Chapter 14 is a draft of a joint paper by Bernays and Popper that did not make it into a publication. Chapter 15 discusses the relation between logical and descriptive signs and situates it in relation to Tarski's concept of logical consequence and to ideas by Carnap in his *Introduction to Semantics* (Carnap, 1942). Chapter 16 is an introduction to an intended study of classical and non-classical negations, which figures prominently in Chapters 5 and 6. Chapter 17 is a somewhat later draft from 1952 which tries to derive truth tables from inferential characterizations. Chapter 18 deals with the distinction between derivation and demonstration, a topic that according to our assessment Popper would have pursued more deeply had he continued to systematically publish in logic. Chapters 19 and 20 are lecture notes (from 1939–1941) and general considerations on the origins of modern logic, respectively. These texts put modern formal logic in a broader philosophical perspective and elucidate how Popper saw logic as a discipline. We here present only a selection of these notes, which we consider to be representative of Popper's views. There are considerably more manuscripts in his Nachlass, though many of them are variants of what is published here.

In the third part we reproduce letters to and from Popper dealing with his logical works. As with the second part, this is a selection of items based on what we consider best suited to situate Popper's logical work and its background in the context of his interactions with colleagues. For somebody who wants to study sophisticated historical issues, letters exchanged with other authors might be relevant, many of which are available in the Karl Popper Collection Klagenfurt and at the Hoover Institution Library & Archives, Stanford.[5]

We decided to omit from this collection materials that deal with one nonetheless important theme, namely Popper's work on Boolean algebra. Popper had studied Boolean algebra already before he moved on to the inferential approach to logic presented here, and studied and discussed it for the rest of his career, combining purely algebraic (lattice-theoretic) investigations with his attempts to axiomatize probability without presupposing deductive logic, and with his interpretation of quantum mechanics and its logic (cf. Miller, 2016; Del Santo, 2020). In Popper's Nachlass one finds a large number of manuscripts dealing with these topics, including bundles full of algebraic calculations, but also with proofs of theorems, some of which are both systematically and historically relevant.[6] In retrospect, in his autobiography of 1974 (Popper, 1974c), Popper even claims that problems in probability theory

[5] Popper's literary estate is located at the Hoover Institution Library & Archives in Stanford. The Karl Popper Collection in Klagenfurt contains copies of the literary estate and Popper's private library.

[6] Del Santo (2020) gives a list of materials from the Karl Popper Collection which are related to the logic of quantum mechanics. Popper himself refers to this work, for example, in the letter to Carnap of 28 May 1944 (this volume, § 23.5). His correspondence with Forder (Chapter 26) is full

led him to his logical work, pointing to the well-known formal relationship between lattice-theoretic and logical properties (Popper, 1974c, fn 188). However, even if this is historically correct and not simply a later attribution[7], we have two strong reasons to not include Popper's work on Boolean algebra in the present volume. Firstly, formal relationships between Boolean algebra and some aspects of inferentialist logic do not affect at all the philosophical rationale for inferentialism. Popper's inferentialist approach to logic is a philosophical conception in its own right and is also understood and presented by him as such. Thus the present volume is self-contained, even though some ideas and results have formal counterparts in other areas. Secondly, the quantity of the notes and papers on Boolean algebra in the Nachlass, if one combined them with an edition of his published papers on probability theory and probabilistic logic, together with Popper's correspondence on these matters, would be so large that it could easily make a volume of its own. Such a volume would be a very welcome companion to the present one, with many interesting interconnections.

Editorial notes Our editorial corrections and additions are marked by ⟨⟩. Published errata have been included tacitly. Other errata, such as those found in letters or unpublished works are marked by ⟨⟩. Obvious typographic errors have been corrected without indication; however, some orthographic errors in Popper's German letters were left in place since he explicitly mentions that he is making them. In our transcriptions of handwritten manuscripts and letters we write ⟨word?⟩ or "word⟨?⟩" where we were unsure about the correct reading of a word. In quotations we use [], as usual, to frame ellipses and our additions or conversions to facilitate the flow of reading.

Popper's expressions $a_1, a_2, \ldots a_n$ and $a_1, a_2 \ldots . a_n$ have been replaced by $a_1, a_2, \ldots, a_n$ throughout. The typesetting of formulas has been unified to some extent, and we have made further minor typographic modifications. For example, section numbers or letters have been moved from the beginning of first paragraphs to centered headings, some lists have been reformatted for better readability, and we have changed the font style of author names from small capitals to normal.

Popper usually cites without providing bibliographic details or bibliographies. We provide references in the text in the format ⟨Carnap, 1942⟩ or in editorial footnotes, which are marked by letters $^{a, b, \cdots}$. Numbers $^{1, 2, \cdots}$ always signify author footnotes. The references sections at the end of chapters have been added by us. The bibliography at the end of this volume comprises all references.

Page concordances for Popper's published works are provided at the end of this volume. In published works, original page breaks are indicated by the symbol | with the original page number in the left margin. Three papers, namely Popper (1947d, 1948a,c), were published both by the Royal Netherlands Academy of Sciences and in Indagationes Mathematicae using the same printing plates (with minor adjustments

of references to Boolean algebra and of discussions of Boolean algebra problems related to logic. The letter to Kleene (§ 28.1) relates to his later interest in the logic of quantum mechanics.

[7] Namely, an attribution made at a time when Popper was involved in issues of probability theory and quantum mechanics. In the logical writings themselves he always describes Tarski's notion of logical consequence as his starting point.

to the titles in Indagationes Mathematicae). We give preference to the former, but also provide page numbers of the latter in the respective concordances.

In Popper's unpublished manuscripts and in his correspondence we indicate page breaks also by the symbol | with page numbers in the left margin. Underlined text is rendered in italics. English translations of letters written in German are provided by us. In many cases, only carbon copies or drafts of letters sent were available to us. These may lack the sender's signature; we have not added it in these cases.

There is a combined person and subject index for the whole volume. As this book is published open access, the reader can also use the freely available electronic version for searches.

Popper almost never wrote abstracts. Those featured in this collection are our additions. Editorial notes for the respective works are given below these abstracts.

References like "KPS Box 12, Folder 10" refer to Popper's Nachlass in the Karl Popper Collection ("Karl Popper-Sammlung") Klagenfurt, which was our main source for Popper's unpublished work.

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