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Bernard Bolzano: Bibliography of the English translations

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Bernard Bolzano. Annotated Bibliography on His Practical Philosophy

Bibliography

1. Bolzano, Bernard. 1996. "Contributions to a Better-Grounded Presentation of Mathematics (1810)." In *From Kant to Hilbert: a Source Book in the Foundations of Mathematics. Vol. I*, edited by Ewald, William, 174-224. Oxford: Clarendon Press. Translation by Steve Russ, (abbreviated: *BD*) revised reprint in *The Mathematical Works of Bernard Bolzano*, pp. 87-137.
 "The work *BD* must be one of the first books devoted to what we would now call foundations of mathematics, or philosophy of mathematics. (Indeed, this latter phrase was the title given to it by Fels for the second edition.) After a short Preface the first main part is devoted to the nature of mathematics and its proper classification. The second part deals with definitions, axioms, proofs, and theorems. It is here that the ground-consequence relation is introduced:
 in the realm of truth . . . a certain objective connection prevails . . . some of these judgements are the grounds of others and the latter are the consequences of the former. (*BD* II § 2)
 He goes on to explain that the proper purpose to pursue in a scientific exposition is to arrange the judgements so as to reflect this objective connection. (p. 21-22)
 (...)
 An important contribution Bolzano makes here is a solution to the problem of how to define, or come to agreement, on the basic or simple concepts of a system. He says we should do so in the same way as we first learn terms in our mother tongue by considering several propositions containing the term (see *BD* II § 8). This is akin to what we would call implicit definition and, of course, is closely related to axiomatic systems. However, this is hindsight; there is no suggestion that Bolzano did, or could, consider axiom systems with the degree of formality familiar since the work of Hilbert.
 Any such book as *BD* could hardly ignore Kant and his thinking about mathematics and accordingly there is an Appendix devoted to a criticism of Kant's theory of the construction of mathematical concepts through pure intuition. The central point of Bolzano's criticism was that the very notion of pure intuition was incoherent containing, he believed, internal contradictions. An excellent account of this, and indeed the whole methodology outlined in *BD*, is contained in Rusnock *Bolzano's Philosophy and the Emergence of Modern Mathematics* (2000), Ch. 2. For a more extended and philosophical discussion of Bolzano's views of proof and their relationship to Kant see Lapointe (forthcoming) [*Bolzano's Semantics and his Criticism of the Decompositional Conception of Analysis*" in *The Analytic Turn*, Michael Beaney (Ed.), London, Routledge, 2007, pp.219-234].
 Steve Russ, from the reprint in *The Mathematical Works of Bernard Bolzano*, pp. 22-23.

2. ———. 1972. *Theory of Science, Attempt at a Detailed and in the Main Novel Exposition of Logic with Constant Attention to Earlier Authors*. Berkeley: University of California Press.
 Translation of selected section of *Wissenschaftslehre* edited by Rolf George.
 The Index lists the complete contents of the first three books of the *Wissenschaftslehre*.
Cited as: George 1972.
 Contents: Acknowledgments VII; Editor's Introduction XXIII; Bibliography XLVIII; Introduction 1; Book One: Theory of Fundamentals 19; Book Two: Theory of Elements 59; Book Three: Theory of Knowledge 303; Book Four: Heuristic 373; Book Five: Theory of Science Proper 385; Index of Special Symbols, phrases and

Sentence Forms 393; Index of Subjects 393; Index of Persons 396; (*) Names Omitted (list of persons to whom reference had to be omitted in the present edition) 398; Translation of Key Terms 399.

"During the earliest stages of my work on this translation, I enjoyed the co-operation and advice of my teacher, the late Henry S. Leonard. A preliminary draft of the first volume was finished in 1958, but at that time I was still thinking of a complete translation of all four volumes. I was eventually persuaded that early complaints about the unnecessary bulk of the work had their point. Kambartel's very successful attempt at shortening the first two volumes (*Bernard Bolzano's Grundlegung der Logik*, Hamburg, 1963) finally convinced me that an abbreviated version was not only feasible, but desirable." (p. VII).

(*) Bolzano's *Wissenschaftslehre* is an admirable source book for, and commentary upon, the history of logical theory. The following is the list of persons to whom references had to be omitted in the present edition." (p. 398)

3. ———. 1973. *Theory of Science*. Dordrecht: Reidel.
 Edited, with an introduction, by Jan Berg. Translated from the German by Burnham Terrell.
 Part A: Selections from the *Wissenschaftslehre* pp. 35-367; Part B: Excerpts from Bolzano's Correspondence pp. 371-383; Bibliography pp. 385-389.
Cited as: Berg 1973.
 Table of Contents: Preface XV; Editor's Introduction 1; Part A. A selection from the *Wissenschaftslehre* (Sulzbach 1837, Leipzig 1914-31) Volume One 35; Volume Two: 167; Volume Three 305; Volume Four 357; Part B. Excerpts from Bolzano's Correspondence 371; Bibliography 385; Name Index 391; Subject Index 393-398.
 "The present selection from the *Wissenschaftslehre* of Bernard Bolzano aims at giving a compact view of his main ideas in logic, semantics, epistemology and the methodology of science. These ideas are analyzed from a modern point of view in the Introduction. Furthermore, excerpts from Bolzano's correspondence are included which yield important remarks on his own work.
 The translation of the sections from the *Wissenschaftslehre* are based on a German text, which I have located in the Manuscript Department of the University Library in Prague (signature: 75 B 459). It was one of Bolzano's own copies of his printed work and contains a vast number of corrections made by Bolzano himself, thus representing the final stage of his thought, which has gone unnoticed in previous editions." (from the Preface).
4. ———. 2014. *Theory of Science*. New York: Oxford University Press.
 First complete translation by Rolf George and Paul Rusnock.
 Volume One: Theory of Fundamentals and Theory of Elements (part I):
 Introduction; Book One: Theory Of Fundamentals; Part I: Of The Existence of Truths in Themselves; Part II: Of the Recognizability of Truth; Book Two: Theory of Elements: Part I: Of Ideas in Themselves.
 Volume Two: Theory of Elements (part II): Book Two: Theory of Elements (continued); Part II: Of Propositions in Themselves; Part III: Of True Propositions; Part IV: Of Inferences.
 Volume Three: Theory of Knowledge and the Art of Discovery; Book Three: Theory of Knowledge; Part I: Of Ideas; Part II: Of Judgements; Part III: Of the Relation Between our Judgements and Truth; Part IV: Of Certainty, Probability, and Confidence in Judgements; Book Four: The Art of Discovery; Part I: General Rules; Part II: Particular Rules.
 Volume Four: Theory Of Science Proper; Book Five: Theory Of Science Proper; Part I: General Rules; Part II: On the Determination of the Extensions of the Sciences; Part III: On the Choice of a Class of Readers for a Treatise; Part IV: On the Propositions Which Should Appear in a Treatise; Part V: On the Divisions of a Treatise; Part VI: On the Order to Which the Propositions Belonging to a Treatise Should Appear; Part VII: Theory of Signs or, On the Signs Used in Or Recommended by a Treatise; Part VIII: How the Author of a Treatise Should Behave; Part IX: On Scientific Books That Are Not Genuine Treatises.

5. ———. 2007. *Selected Writings on Ethics and Politics*. Amsterdam: Rodopi. Translated by Paul Rusnock and Rolf Georg. Contents: Introduction 1; I. Selected Exhortations 43; II. On Rights, Civil Disobedience, and Resistance to Authority 141; III. Ethics and Philosophy of Religion 169; IV. Political Philosophy 241; V. Index 359-368. "In his own day, few appreciated Bolzano's contributions to theoretical philosophy and mathematics: only a small number were *even* aware that he had done this work. He was renowned, rather, for his work as "catechist". professor of religious science (*Religionswissenschaft*) at the Charles University in Prague from 1805 to 1819. In this highly visible position, Bolzano had become one of the most prominent advocates of social justice and reform in his homeland, a national philosopher who was the "social and political conscience of Bohemia" (4) (4) W. Künne, "Bernard Bolzano über Nationalismus und Rassismus in Böhmen," p. 97-139 in E. Morscher and O. Neumaier ed. *Bolzanos Kampf gegen Nationalismus und Rassismus*. Beiträge zur Bolzano-Forschung 4, Sankt Augustin: Academia Verlag. 1996, p. 97.
6. ———. 2015. "On the Concept of the Beautiful: A Philosophical Essay (§§1–25)." *Estetika: The Central European Journal of Aesthetics* no. 52:229-266. Partial translation by Adam Bresnahan of *Über den Begriff des Schönen. Eine philosophische Abhandlung* [On the concept of the beautiful. A philosophical treatise] (Prague, 1843). "Preface
The fact that I have decided to fill so many pages with the analysis of a single concept may for some seem to demand explanation. I can only reply that this concept seems to me to be of particular importance; and further, that the analysis of concepts is a matter that always demands expansive inquiries if one is to go beyond merely saying that the concept is reducible to its parts and actually convince the reader, thus also taking care to demonstrate that the attempts at explicating the concept that have been made thus far are lacking in one way or another. After I have completed this essay on the fundamental concept of aesthetics, I will not deem it necessary to proceed with such thoroughness in the essays that follow." (p. 229)
7. ———. 2004. *The Mathematical Works of Bernard Bolzano*. Oxford: Oxford University Press. Contents: Preface XII, Introduction 1; Part I: Geometry and Foundations 11. 1.1: Elementary Geometry (1804) 25; 1.2: Contribution to a Better-Grounded Presentation of Mathematics (1810 83); Part II: Early Analysis 139. 2.1: The Binomial Theorem (1816) 155; 2.2: A Purely Analytic Proof (1817) 255; 2.3: Three Problems of Rectification, Complanation and Cubature (1817) 279; Part III: Later Analysis and the Infinite 345. 3.1: Infinite Quantity Concepts (1830s) 355; 3.2: Theory of Functions (1830s) 429; 3.3: Improvements and Additions to the Theory of Functions (F+) 573; 3.4: Paradoxes of the Infinite (posthumous 1851) 591; Selected Works of Bernard Bolzano 679; Bibliography 685; Name Index 691; Subject Index 693. "The main goal of this volume is to present a representative selection of the mathematical work and thought of Bolzano to those who read English much better than they could read the original German sources. It is my hope that the publication of these translations may encourage potential research students, and supervisors, to see that there are numerous significant and interesting research problems, issues, and themes in the work of Bolzano and his contemporaries that would reward further study. Such research would be no small undertaking. Bolzano's thought was all of a piece and to understand his mathematical achievements properly it is necessary to study his work on logic and philosophy, as well as, to some extent, on theology and ethics. Of course, it would also be necessary to acquire the linguistic, historical, and technical skills fit for the purpose. But the period of Bolzano's work is one of the most exciting periods in the history of Europe, from intellectual, political, and cultural points of view. And with over half of the projected 120 volumes of Bolzano's complete works (*BGA*) available, the

resources for such research have never been better. The work on mathematics and logic has been particularly well-served through the volumes already published." (p. XII).

8. Ewald, William. 1996. *From Kant to Hilbert: A Source Book in the Foundations of Mathematics. Vol. I.* Oxford: Clarendon Press.
Contents: 6. Bernard Bolzano (1781-1848): A. Preface to Considerations on some objects of elementary geometry 172 (Bolzano 1804); B. Contributions to a better-grounded presentation of mathematics 174 (Bolzano 1810); C. Purely analytic proof of the theorem that between any two values which give results of opposite sign there lies at least one real root of the equation 225 (Bolzano 1817a); D. From Paradoxes of the infinite 249-292 (Bolzano 1851).
9. Bolzano, Bernard. 1950. *Paradoxes of the Infinite.* London: Routledge & Kegan Paul.
The *Paradoxien* originally appeared in 1851, were reprinted in facsimile in 1889 and edited afresh in 1921 by A. Höfler, with annotations by H. Hahn.
Translated from the German of the posthumous edition by Franz Prihonský and furnished with a historical introduction by Donald A. Steele.
New translation in *The Mathematical Works of Bernard Bolzano*, pp. 591-678.
Contents: Short title key to Bolzano references IX; Donald A. Steele: Historical Introduction 1; Translation 59; Selected bibliography 176; Index of Persons and Place 185; Index of Topics 188-189.
"The *Paradoxien* are the work of Bolzano's old age. Indeed, the modern mathematical reader who takes the text as it stands will be occasionally disappointed, and may misjudge Bolzano if he has not also read his earlier work. The qualification of taking the text 'as it stands' is not otiose. Our received version, here translated from the 1851 Leipzig edition, is a posthumous one by a friend with whom Bolzano discussed the topics in question for the last few years of his life. The competence of Prihonsky, as an editor of mathematical matter and the trustworthiness of the received version of the *Paradoxien* have recently been placed in doubt by Martin Jasek, the discoverer of the counter-example.
The antecedents of the *Paradoxien* go back at least as far as 9 June 1842, when Bolzano read 'that part of his paper on the march of ideas to be followed in a truly scientific exposition of mathematics which deals with the finite and infinite.' The next traces are three instalments of papers read as follows: on 9 January 1845 about 'a solution of sundry paradoxes occurring in the mathematical sciences'; on to December 1846 about 'calculations with infinite numerical expressions'; and on 24 February 1848 about 'the paradoxes occasioned in mathematics by the idea of the infinite.' The gradual crystallisation of the eventual title is manifest. Between the first and second paper, on 3 February 1845, Bolzano wrote to Prihonsky that he was busy with sundry paradoxes in mathematics; between the second and third, he wrote twice to Fesl: on 26 February 1848 that he now realised more than ever the importance of the topics of the *Paradoxien* for mathematics and its philosophy, and on 24 June 1848 that the matter for the *Paradoxien* is constantly expanding under his pen. Finally, on 30 November 1848, only eighteen days before his death, Bolzano read a final instalment under the final title of *Paradoxien des Unendlichen*. Unlike the manuscript of the *Funktionenlehre*, that of the *Paradoxien* was never made ready for the press by the author himself. That task fell to his devoted but none too mathematical friend Prihonsky. In fact, Bolzano himself had entertained doubts about the posthumous treatment of his mathematical papers, for he wrote to Fesl as early as 12 June 1842 that he was convinced 'that his mathematical ideas, in their present form, could not be really well edited by any of his friends.' This premonition on Bolzano's part comes to corroborate the suspicions of Jasek. Those suspicions were aroused by a palpable contradiction between the *Funktionenlehre* and the *Paradoxien*.
The received text of §37, pages 65-66, as distinguished from the footnote, makes no actual assertion as to the universal existence of derivatives of continuous functions; Bolzano simply intends to choose such as are differentiable for a certain purpose:

'*Ich begehre nichts anderes, als dass.*' But a footnote says it can be shown that 'all well defined functions' are bound to be differentiable 'save possibly for a set of arguments which may indeed be infinite, but whose members must be individually isolated.' No proof is attempted. Jasek ('Aus dem handschriften Nachlass Bernhard Bolzanos', *Vestník Kralovské České Společnosti Nauk, Trida matematicko-prirodovedecká* (1923), pp. 29-32) claims to possess evidence that the footnote is interpolated. He suspects Slivka von Slivitz, another pupil and friend of Bolzano, of being Prihonsky necessary but not sufficient mathematical counsellor, and of having timorously desired to shield Bolzano from the appearance of mathematical heresy which his counterexample may well have borne to contemporaries.

A fresh critical study of the manuscript is indicated, and external obstacles stand in the way for the present. The difficulty does not, however, reside solely in the passage noticed by Jasek. It recurs in §45, page 88. Strictly speaking, again, there is even here no actual assertion that all continuous functions are differentiable, and the question is further complicated by the admitted fact that the posthumous editor found the manuscript in places rather illegible, in spite of his acquaintance with Bolzano's peculiar abbreviation practices. The presumption of guilt on the part of von Slivitz is slightly enhanced, in Jasek's eyes, by a study of his marginal annotations to a copy of the *Funktionenlehre*. With baffling contrariety, it is also slightly alleviated by the fact that the *Zusammensetzung der Kräfte*, published in 1842 by Bolzano himself -- and embodying with acknowledgement some suggestions by von Slivitz -- proceeds (§52, page 29) to differentiate a function of which only the continuity is known, together with its satisfaction of conditions which are not quoted as if they established the otherwise uncertain differentiability. The hypothesis that Bolzano's mathematical discrimination had become dulled between 1830 and 1848 on this point at least is simple and not to be rejected *a priori*; but neither is it to be accepted easily until renewed and exact archival research compels us to do so." (pp. 53-55).

10. ———. 2004. *On the Mathematical Method and Correspondence with Exner*. Amsterdam: Rodopi.
Translated by Paul Rusnock and Rolf George.
Contents: Acknowledgements 4; Introduction 5; A note on the translation 37; I. On the Mathematical Method 39; II. Selections from the Bolzano-Exner Correspondence 83; III. Bolzano and Exner on Ideas and their objects: an exchange from 1843 175; IV. Indices 185; Index of Names 186; Index of Subjects 188-191. There are three versions of the essay on mathematical method; the translation is from the latest version (pp. 23-78 of the original edition).
"It is clear that Bolzano was not satisfied with the logic set out in the *Contributions* [1810]. Already in 1812 he had resolved to write another treatise on logic,⁽⁴⁾ a project he worked on for close to a decade following his dismissal. The result was one of the great works of nineteenth-century philosophy, the *Theory of Science*.⁽⁵⁾ The *Theory of Science* was ready for the press by 1830, at which time Bolzano started writing the *Theory of Magnitudes* [*Grossenlehre*], a treatise intended to supply a unified foundation for all of contemporary mathematics.⁽⁶⁾ Although he wrote several hundred pages, many of them all but ready for the press, but died before finishing his work. Some elements of his mathematical system were published after his death in the *Paradoxes of the Infinite*,⁽⁷⁾ edited by his friend and student F. Prihonsky, but the bulk remained all but unknown until well into the twentieth century. The essay "On the Mathematical Method", translated here, formed part of the introductory matter of the *Theory of Magnitudes*, and was intended to present the essentials of Bolzano's logic to a mathematical audience. Due in large part to his troubles with the Austrian authorities, the *Theory of Science* remained unpublished for almost a decade (it was finally published outside Austria, in Bavaria, in 1837). This did not mean, however, that Bolzano's logic remained unknown. Long accustomed to an invasive and often arbitrary censorship, Bohemian intellectuals had developed unofficial channels for communicating their ideas, a precursor of the *Samizdat* system which was later to flourish in that land.

Bolzano's mature logic received its first airing in this way, when, in 1833, he had a copy made of the essay on mathematical method and sent it to Franz Exner, the newly appointed professor of philosophy in Prague.(8)

Exner (1802-1853) was born and educated in Vienna, where he studied philosophy with Rembold, who like Bolzano (and for similar political reasons) had been removed from his university chair in 1825. In 1830, Exner was put in the uncomfortable position of taking his teacher's place, being called upon to fill the vacant chair on a temporary basis. In 1832 he moved to Prague, where he was named to the chair of philosophy. Outside of his official duties, in good Austrian fashion, he organized a "circle" of intellectuals which met regularly at his house. Although a born and bred Viennese, he was sensitive to the special circumstances of Bohemia, particularly to the disadvantaged situation of the Czech majority. Politically, though not always philosophically, he was very much on Bolzano's side: with the Bohemian enlightenment and opposed to the conservative reaction in both church and state. Exner was a follower of Herbart, who had a substantial following in Austria at the time, and whose doctrines were to become in effect the official philosophy of the Empire, in part due to Exner's influence when he worked for the Ministry of Education from 1845 until his death.(9)

Exner responded to Bolzano in June of 1833, beginning a correspondence that would continue for the rest of Bolzano's life. The most intense philosophical exchanges occurred during 1833 and 1834, when the letters translated here were written. The two continued their discussion in person in 1834, when Bolzano returned to Prague from June to November. There would also be a later exchange of views in a pair of papers read at the Royal Bohemian Academy of Sciences in the early 1840s. We have translated Bolzano's contribution, which contains the relevant passages from Exner's, in this volume." (pp. 6-8)

(4) *Philosophische Tagebücher* 1811-1817, in J. Berg, F. Kambartel, J. Louzil, B. van Rootselaar, and E. Winter ed., Bernard Bolzano-Gesamtausgabe (hereafter BBGA) (Stuttgart-Bad Cannstatt 1969-) Series 2B Vol. 16/1, p. 34-36.

(5) *Wissenschaftslehre* (Sulzbach, 1837). New edition by Jan Berg in the BBGA. Hereafter WL.

(6) BBGA IIA, Vols. 7-10; Volumes 7, 8 and 10/1 have already been published.

(7) *Paradoxien des Unendlichen* (Leipzig, 1851), English translation by D. Steele (London: Routledge and Kegan Paul, 1950).

(8) Three versions of the essay on mathematical method survive. Our translation is based upon the latest version. Most likely, however, the version that Exner received differed somewhat from this one. A Czech translation of an earlier work on logic, "O logice" (= "Etwas über Logik" BBGA 2A5, p. 139-168), was actually published somewhat earlier (1831).

(9) Cf. *Biographisches Lexicon des Kaiserthums Oesterreich*, part 4 (Vienna, I 858); *Allgemeine deutsche Biographie*, vol. 6 (Leipzig, 1877).

11. Russ, S. B. 1980. "A translation of Bolzano's paper on the intermediate value theorem." *Historia Mathematica* no. 7:156-185.
Summary: "This is the first English translation of Bolzano's paper, *Rein analytischer Beweis des Lehrsatzes, dass zwischen je zwey Werthen, die ein entgegengesetztes Resultat gewahren, wenigstens eine reelle Wurzel der Gleichung liege* (Prague 1817). It has already appeared in French, Russian, and Czechoslovakian translations.
The paper represents an important stage in the rigorous foundation of analysis and is one of the earliest occasions when the continuity of a function and the convergence of an infinite series are both defined and used correctly."

Note: The content of the two anthologies from the *Wissenschaftslehre* is different, so the books are complementary.

Excerpts from the *Theory of Science*

The main work of Bolzano, *Wissenschaftslehre*, (1837) was published in four volumes: *Wissenschaftslehre: Versuch einer ausführlichen und grösstentheils neuen Darstellung der Logik, mit steter Rücksicht auf deren bisherige Bearbeiter*. Herausgegeben von mehreren seiner Freunde. Mit einer Vorrede von Dr. J. Cr. Heinroth. - Sulzbach.

Critical edition edited by Jan Berg: *Gesamtausgabe* - Voll.11-14 (1985-2000).

Vol. I XVI+571 [3], vol. II VIII+568+[2], vol. III VIII+575 and vol. IV XX+683 pages; the work is composed of five books in 718 paragraphs.

Summary (from the translations of Rolf George [George 1972] and Jan Berg [Berg 1973]; the citations by Bolzano are from the *Introduction*, 15):

Introduction (1-16). Logic as a theory of science

Book One: Theory of Fundamentals Truths (17-45) "including the proof that there are truths in themselves and that we humans also have the capacity to know them"

Purpose, Contents and Divisions of this Book (17)

Refutation of some Objections (18)

Part One: Of the Existence of Truths in Themselves (19-33)

Part Two: Of the Recognizability of Truth (34-45)

Book Two: Theory of Elements "or the theory of ideas, propositions, true propositions and inferences in and of themselves"

Purpose, Contents, and Sections of this Book (46)

Part One: Of Ideas in Themselves (47-114)

Appendix: Earlier Treatment of the Subject Matter of this Part (115-120)

Part Two: Of Propositions in Themselves (121-184)

Appendix: Earlier Treatment of the Subject Matter of this Part (185-194)

Part Third: Of True Propositions (195-222)

Part Fourth: Of Arguments (223-253)

Appendix: Earlier Treatment of the Subject Matter of this Part (254-268)

Book Three: Theory of Knowledge "or concerning the conditions underlying the possibility of knowing the truth, particularly among us humans"

Purpose, Content, and Divisions of this Book (269)

Part One: Of Ideas (270-289)

Part Two: Of Judgments (290-306)

Part Third: Of the Relation between Judgments and Truth (307-316)

Part Fourth: Of Certainty, Probability and Confidence in Judgments (317-321)

Book Four: The Art of Invention (322-391) "or rules to be observed in the enterprise of thought when it is aimed at discovering the truth"

Book Five: Theory of Science proper (392-718) "or rules that must be observed in dividing up the domain of truth generally into particular sciences and in presenting those sciences in specialized scholarly treatises."

1. *What the Author Understands by Theory of Science*

Suppose that all truths which are now, or ever were, known to any man were somehow collected together, e.g. compiled in a single book; I would call such an aggregate the sum of all human knowledge. Compared to the immense domain of truths in themselves, most of which are altogether unknown, this sum is very small; but it is large, ever too large a sum for the mental capacity of any man.(...)4. It should be possible through some reflection to find the rules which we must follow in dividing the total domain of truth into individual sciences and which must govern the writing of the respective treatises. There can also be no doubt that the sum of these rules itself deserves to be called a science, since it is clearly worth while to collect the most important part of the in a special book, and to order the and provide proofs for them so that everyone can understand and accept them with conviction. I allow myself to call it the theory of science [*Wissenschaftslehre*], since it is the science which teaches us to represent other sciences (actually only their treatises) (...) [Berg 1973]

§ 15. *General Outline of this Treatise*

It is desirable that the theory of science proper should be preceded by a discussion of rules to be followed in the discovery of truths: heurctic. Heurctic seems to require an antecedent discussion of

the general conditions of human knowledge: epistemology. Epistemology can be fruitfully developed only if it is preceded by the theory of ideas, propositions and deductions: the theory of elements. The latter will be preceded by a theory of fundamentals in which it is proved that there are truths and propositions in themselves. [George 1972].

§ 19. *What the author Means by a Proposition in Itself*

In order to indicate as clearly as possible to my readers what I mean by a proposition in itself (*Satz an sich*), I shall begin by explaining first what I call as assertion or a proposition expressed in words. I use this term to designate a verbal statement (most often consisting of several, but at times of just a single word) if it is an instrument of asserting or maintaining something, if it is therefore always either true or false, one of the two, in the ordinary sense of these words, if it (as can also say) must be either correct or incorrect (...). But I also call the following sequence of words a proposition: 'Squares are round'. For through this form of words something is also stated or asserted, although something false and incorrect. On the other hand, I do not call the following expressions propositions: 'The omnipresent God', 'A round square'. For though these expressions something is indeed represented but nothing is stated or asserted. Consequently one can, strictly speaking, neither say that there is anything true, nor that is anything false in them. [Berg 1973].