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Logic and the Philosophies of Mathematics, Science, and Social Sciences

BIBLIOGRAPHIES

721. Ashworth, E. J. **The Tradition of Medieval Logic and Speculative Grammar from Anselm to the End of the Seventeenth Century: A Bibliography from 1836 Onwards.** Toronto: Pontifical Institute of Medieval Studies, 1978. 111p.

Records secondary works (books, articles, some lengthy book reviews, and a few dissertations) and modern editions of texts concerned with formal logic from the period indicated in the main title. Its scope is conceived "as including such topics as consequences, syllogistic, supposition theory, and speculative grammar, but as excluding such topics as the categories, the struggle between nominalism and realism, and pure grammar" (pref.). Lists 879 items in two parts covering respectively the period up to and after Paul of Venice. Four indexes cover names, texts, translations, and subjects.

722. Blackwell, Richard J. **Bibliography of the Philosophy of Science, 1945–81.** Westport, Conn.: Greenwood Press, 1983. 585p.

Offers comprehensive coverage of the vast literature on the philosophy of science from the years designated in its title. In this period, Blackwell notes, the field emerged as "not only a separate and distinctive branch of philosophy but more significantly as a role model which has had considerable impact on the more traditional parts of philosophy," and often beyond philosophy, as in "one preeminent case, Kuhn's notion of cognitive paradigms" (introduction). The bibliography comprehends both issues concerning the methodology, epistemology, and conceptual framework of science, and issues raised by specific scientific concepts, doctrines and theories, such as quantum mechanics and relativity theory in the physical sciences, biological species and evolution in the biological sciences. Excluded are cognate areas such as philosophy of logic and mathematics, philosophy of technology, philosophy of social sciences, and value issues raised by the natural sciences.

Items cited include books, articles in journals and collections, and book reviews, but not dissertations. Arrangement is topical, and there is an author index. Appendices list volumes in three major series in the philosophy of science, which are also frequently referenced in the bibliography.

723. Cassel, Jeris F., and Robert J. Congleton. **Critical Thinking: An Annotated Bibliography.** Metuchen, N.J.: Scarecrow, 1993. 403p.

See entry 748.

724. Risse, Wilhelm. **Bibliographia Logica.** Hildesheim: Georg Olms, 1965–1979. 4 vols.

No other branch of philosophy presently possesses a bibliography quite so extensive and comprehensive as this one for logic, which is a by-product, as the *Vorwort* explains, of Risse's systematic history of the development of logic, *Die Logik der Neuzeit* (1964–).

Volume 1 (1965, 293p.) lists in chronological arrangement monographs published from 1472 to 1800. Volume 2 (1973, 494p.) does the same for the period 1801–1969. Both volumes cite holding libraries (mainly European but also some American) for most of the works listed. Volume 3 (1979, 412p.) lists articles published both in periodicals and in anthologies, arranged according to a detailed classification system outlined in the front. Volume 4 (1979, 390p.) is a catalogue of 3,006 manuscripts, arranged by author if known and by title if anonymous, with separate sections for medieval and more recent manuscripts. Holding libraries or archives are indicated.

All volumes are thoroughly indexed.

725.   Robert, Jean-Dominique. **Philosophie et science: Eléments de bibliographie / Philosophy and Science: Elements of Bibliography.** Paris: Beauchesne, 1968. 384p. (Bibliothèque des archives de philosophie, nouvelle série, 8).

Prior to Blackwell's 1983 work (entry 722), Robert's was the closest thing to a full-scale general bibliography of the philosophy of science. Its focus, however, is the relations between philosophy and science—or as the introduction puts it, "the problems set up both by the distinction between philosophy and sciences and also their necessary connection"—rather than philosophy of science as such. Many works by scientists which bear on these issues are included, among them a number of popular writings addressed to a wide public. Writings in French are probably most numerous, but English runs a very respectable second, with other European languages also well represented.

The majority of entries are grouped under *Travaux catalogues par nom d'auteurs* (works listed by authors' name). They are *coded* to indicate subject matter: for example, "B" for works relating to biology, "PY" for physics. Sections 3 and 4 are supplements to the main body of the bibliography, covering the years 1965–1966 and 1966–1967.

DICTIONARIES, ENCYCLOPEDIAS, AND HANDBOOKS

726.   Baggini, Julian and Peter S. Fosl. **The Philosopher's Toolkit: A Compendium of Philosophical Concepts and Methods.** Malden, Mass.: Blackwell, 2003. 221p.

If logic in its broadest sense is concerned with how conclusions can be supported, then this can be characterized as a compendium of logical tools available to, and used by, philosophers—or anyone else. In any case, logic in the narrower (but still broad) sense embodied in many first-year logic texts accounts for a good share of the tools systematically catalogued and concisely described in this guide, particularly its first two chapters on "basic" and "further" tools for argument. Later chapters range increasingly beyond standard logic topics. "Tools for Assessment" addresses such matters as category mistakes, the is/ought gap, Leibniz's law of identity, and Ockham's razor. "Tools for Conceptual Distincitions" addresses, for example, the analytic/synthetic, necessary/sufficient, and type/token distinctions. "Tools for Radical Critique" discusses lines of critique as varied as class critique, empiricist critique of metaphysics, feminist critique, pragmatist critique, and Sartrean critique of "bad faith." Finally, "Tools at the Limit" takes on several controverted

topics including basic beliefs, Gödel and incompleteness, possibility and impossibility, self-evident truths, and underdetermination of theory.

727.   Bynum, William F., E. J. Browne, and Roy Porter, eds. **Dictionary of the History of Science.** Princeton: Princeton University Press, 1981. 494p.

Topics in the philosophy of science are a minority, but a substantial minority, among those covered by this excellent reference work. It usefully supplements existing dictionaries devoted specifically to philosophy of science (notably entries 730 and 742), and its combination of philosophical and historical material can offer some special benefits. An analytical table of contents in the front helpfully identifies 130 entries relating specifically to philosophy of science. Thirty-three of these are indicated to have bibliographies. Topics are as diverse as causality in quantum physics, Mill's canons, paradox of the ravens, and theory-laden terms. Other philosophical (or philosophically infused) topics are listed under the heading "Human Sciences" and include chain of being, man–machine, mind–body relation, and Social Darwinism.

There are no biographical entries as such, but a biographical index at the back gives basic biographical data as well as references to pertinent articles. It includes numerous philosophers, both classical (Bacon, Descartes, Leibniz, Mach, Spencer) and recent or contemporary (Carnap, Nagel, Popper).

728.   Detlefsen, Michael, David Charles McCarty, and John B. Bacon. **Logic from A to Z.** London: Routledge, 1999. 116p.

This is in considerable part a derivative work: a cover blurb proclaims that it was "first published in the most ambitious international philosophy project for a generation: the *Routledge Encyclopedia of Philosophy.*" Yet despite this frank and unqualified acknowledgement, this is *not* simply a reprinting or reformatting of the article "Logical and mathematical terms, glossary of" in the print version of the *REP* (entry 150), although that constitutes its core. For example, *Logic from A to Z* has 36 entries (not counting cross-references) under "A," while the *REP* article has just 9. And under "M," the entry count is 15 versus 8. In addition, some duplicated entries have had minor revisions, for example, those for "analytic/synthetic" and "normal form (conjunctive)." Thus even individuals and libraries that have the print *REP* may find this a worthwhile supplementary resource for the technical vocabulary of formal logic and philosophy of mathematics. Those with access to the online *REP* (entry 152) will find the additions and revisions incorporated there.

Another useful feature here is a table of logical symbols. Occasionally, the work falls short. For instance, it lacks entries for "modal logic" or "modality" though these occur in the definitions of other terms such as "*de re / de dicto*" and "syllogism, modal." (In the full *REP,* this omission from the glossary is remedied by several independent articles on modal logic.)

A companion volume for informal logic is entry 745.

729.   **Dictionary of Logic as Applied in the Study of Language: Concepts/Methods/ Theories.** Ed. Witold Marciszewski. The Hague: Martinus Nijhoff, 1981. 436p. (Nijhoff International Philosophy Series, vol. 9).

While the main theme of this dictionary is the application of logic in the study of language, many of its articles should be of more general interest to logicians, philosophers of

science and mathematics, information scientists, and others. It does presuppose an advanced level of knowledge of the general field of logic. The 72 articles (there are no short definitions) treat topics as diverse as analyticity, the method of counterexample, decidability, definition, Gödel's theorem, many-valued logic, Polish notation, quantifiers, questions, logical syntax, trees, truth, and the theory of types. Each article includes bibliographic references, and there is a general bibliography at the back (dominated by English-language writings, perhaps surprising in view of the fact that the editor and 13 of 15 contributors are Polish scholars). Also at the back are an index of symbols and a subject index and glossary, the latter serving mainly to correlate synonymous terms and expressions.

730.   Durbin, Paul T. **Dictionary of Concepts in the Philosophy of Science.** Westport, Conn.: Greenwood Press, 1988. 362p. (Reference Sources for the Social Sciences and Humanities, no. 6).

Durban describes his work as presenting a "summary of approximately 100 basic controversies (or would-be controversies) covering all the subfields of contemporary philosophy of science. . . . The most likely users of the book are upper level undergraduate students taking a philosophy of science course or thinking about doing so, graduate students similarly situated, or educated general readers. . . . " (introduction). Entries represent concepts around which controversies have grown up, including substantive scientific concepts (e.g., causality, evolution, forces and fields, quantum mechanics), methodological concepts (e.g., confirmation, falsification, hypothetico–deductive method), and domains of scientific thought or inquiry (e.g., astronomy, sociobiology). Articles include bibliographies. Index.

731.   Erickson, Glenn W., and John A. Fossa. **Dictionary of Paradox.** Lanham, Md.: University Press of America, 1998. 220p.

Not all paradoxes examined in this alphabetically arranged dictionary are philosophical, for example the paradox of acting and the productivity paradox. A good majority, however, are philosophical in nature or have philosophical import. Notable in the former category are various logical paradoxes, such as the famous liar's paradox and paradoxes of material implication, and paradoxes of self-reference such as those of cognitive relativism and the verification principle. There are also paradoxes relevant to philosophical domains such as ethics (e.g., the paradox of loyalty and the victim's paradox), political philosophy (e.g., the paradox of libertarianism and the paradoxes of voting), and philosophy of religion (e.g., the Eden paradox and the goodness problem). Paradoxes from other fields that have philosophical import include, for instance, Einstein's clock paradox and the Einstein-Podolsky-Rosen paradox from physics, and a variety of paradoxes from mathematics and set theory. Many entries follow a common pattern: formulation, explanation, and resolution (the latter usually presenting suggested or debated rather than definitive resolutions). Most also have references to related readings. A few articles discuss categories of paradox such as literary, logical, and mathematical.

732.   Fetzer, James H., and Robert F. Almeder. **Glossary of Epistemology/Philosophy of Science.** New York: Paragon House, 1993. 149p. (Paragon House Glossary for Research, Reading, and Writing).

See entry 637.

733.   Feys, Robert, and Frederic B. Fitch. **Dictionary of Symbols of Mathematical Logic.** Amsterdam: North Holland, 1969. 171p. (Studies in Logic and the Foundations of Mathematics).

That the label "dictionary" may not entirely fit this work is suggested both in the preface by Feys, the original editor, and the foreword by Fitch, who completed the project. Its purpose is "to enable the reader to find with some ease the meaning and interpretation of symbols currently used in mathematical logic," particularly in a handful of classic and standard texts (identified in the front) and in the *Journal of Symbolic Logic.* It is "intended for readers not having previous knowledge of mathematical logic as well as for logicians who want an explanation of a notation outside their usual fields" (preface), but would be difficult for a beginning student to use. The order of presentation is *systematic,* partly because "the language of mathematical logic is … the language of a *formalized* theory," the exact meanings of whose symbols may not be grasped intuitively or given direct verbal translations, but must be understood in the context of the corresponding formalized system with its axioms, rules, and definitions.

Apart from preliminaries, there are nine chapters covering the following areas of logic: propositional calculus; first-order functional calculus; functional calculus of higher orders, and the theory of types; combinatory logic; calculus of classes; calculus of relations; arithmetic formalized as an independent discipline; numbers as defined within systems of logic; and metamathematics. Indexes of names, subjects, and symbols follow.

734.   Grattan-Guinness, Ivor. **Companion Encyclopedia of the History and Philosophy of the Mathematical Sciences.** London: Routledge, 1993. 2 vols.

The 176 articles in this *Companion Encyclopedia* are arranged into several sections ranging from Ancient and non-Western traditions through the influence and role of mathematics in contemporary culture. Philosophical issues associated with mathematics, while they do not play the major role throughout, receive attention at numerous points and most concentratedly in section 2.12 ("The philosophical context of medieval and Renaissance mathematics"), most of part 5 ("Logics, set theories, and the foundations of mathematics," including section 5.9, "Some current positions in the philosophy of mathematics"), section 6.9 ("The philosophy of algebra"), section 7.8 ("The philosophy of geometry to 1900"), and section 10.17 ("Philosophies of probability").

735.   Greenstein, Carol Horn. **Dictionary of Logical Terms and Symbols.** New York: Van Nostrand Reinhold, 1978. 188p.

"The primary objective … is to present compactly, concisely, and side by side a variety of notational systems currently used by logicians, computer scientists, and engineers" (preface). That objective, and the considerable success with which it is achieved, should be appreciated by anyone who has ever contended with the differences among notational systems. Familiar, and less familiar, logical expressions, from simple connectives to basic argument forms, are shown not only in such notational systems as Boolean, Polish, Peano-Russell, Hilbert, and set-theory, but even in such modes of representation as logic gates, truth tables, Euler and Venn diagrams, and squares of opposition. In addition to coverage of the more conventional areas of logic—sentential, quantificational, syllogistic, and modal—there are separate sections for notation in epistemic, doxastic, deontic, and tense logics. Greenstein has also gone beyond her stated primary objective by providing

two additional and highly useful features: a list of abbreviations and acronyms prevalent in logical and computer literature, and a 77-page glossary of logical terms.

736.   Handbook of Philosophical Logic. 2nd ed. Ed. D. M. Gabbay and F. Guenthner. Dordrecht, Netherlands: Kluwer Academic, 2001–. Vols. 1–.

A systematic survey of the key topics of philosophical logic rather than, say, an alphabetically arranged encyclopedia, this can be considered borderline as a reference work. However, in its comprehensiveness, and as the product of a collaborative effort by an international team of authorities, it does perform an encyclopedic function, or something close to it. As such it should prove useful, as the editors aver of the 4-volume first edition (Dordrecht: D. Reidel, 1983–89), not just to logicians or philosophers in general but also to linguists, mathematicians, and "consumers of logic in many applied areas" including computer science and artificial intelligence (vol. 1, preface). Perhaps regrettably, the editors have found that since the first edition "the subject has evolved and its areas have become interrelated to such an extent that it no longer makes sense to dedicate volumes to [specific] topics," though the volumes do, as they say, "follow some natural groupings of chapters" (ibid.). The second edition is projected to reach around 18 volumes. The latest at this writing is Volume 11, published in March 2004.

737.   Jacquette, Dale, ed. A Companion to Philosophical Logic. Malden, Mass.: Blackwell, 2002. 576p. (Blackwell Companions to Philosophy, 22).

Like some other Blackwell Philosophy Companions, this is borderline as a reference work—organized thematically rather than alphabetically and lacking special reference features apart from a short "Resources for Further Study" section (pp. 771–75) that includes some internet sites and a list of organizations—but it pulls together an unusually comprehensive and authoritative overview of its expansive field within the compass of a single volume. Around 50 authorities representing universities throughout the world, many of them leaders in the field, contributed the previously unpublished articles. All, says the editor, "are intended for an introductory audience, and can be read with good understanding by beginning students who have completed a first course in symbolic logic"—possibly a slightly optimistic assessment for some instances. All articles include bibliographic references, many also suggestions for further reading. No grand organizing scheme is transparent—the preface describes some "invisible divisions"—but the 46 articles are clustered into 14 of "the most important topic areas in philosophical logic from the standpoint of students as well as professionals in the field" (preface). Examples include "Historical Development of Logic"; "Symbolic Logic and Ordinary Language"; "Modal Logics and Semantics"; "Inductive, Fuzzy, and Quantum Probability Logics"; "Logic, Machine Theory, and Cognitive Science."

738.   Kondakov, Nikolai Ivanovich. Logicheskii slovar'-spravochnik. 2nd ed. Moscow: Nauka, 1975. 720p. German translation, **Wörterbuch der Logik.** Ed. Erhard Albrecht and Gunter Asser. Leipzig: Bibliografisches Institut, 1978. 554p.

This Russian work—note the German version—is probably the most comprehensive encyclopedic dictionary of logic built on an alphabetical arrangement and also centrally concerned with definitions. An earlier Russian edition was published in 1971 under the title *Logicheskii slovar'*.

739. Lecourt, Dominique, ed. **Dictionnarie d'histoire et de philosophie des sciences.** Paris: Presses universitaires de France, 1999. 1,032p.

Similar in concept to the 1981 *Dictionary of the History of Science* (entry 727), this more recent French dictionary integrates treatment of the philosophy of science with extensive coverage of the history of science that so often informs it. Historically oriented articles deal with the many branches of science from geology to astrophysics; with key theories, scientific breakthroughs, and inventions; with notable figures and institutions; and with substantive concepts of science that have raised philosophical issues, such as *anti-matière, force, infini,* and *"masse (de Newton à Einstein)."* Entries closely identified with philosophy of science explore aspects and issues of scientific method, for example, *adduction, induction, modèle;* the broad interpretation of science's results, for example, *formalisme, réalisme;* and wider philosophical problems raised in particularly pointed ways in the context of science, for example, *causalité, nécessité, rationalité.* In contrast to its English-language counterpart, Lecourt's dictionary includes biographical articles both on history's leading scientists and on philosophers who have thought and written about the nature of science. There are separate indexes of names and subjects.

An international contingent of more than 150 scholars collaborated on this project.

740. Malone, Edward A., ed. **British Rhetoricians and Logicians, 1500–1660. First Series.** Detroit: Gale, 2001. 432p. (Dictionary of Literary Biography, vol. 236). **Second Series.** Detroit: Gale, 2003. 473p. (Dictionary of Literary Biography, vol. 281).

See entry 348.

741. Mittelstrass, Jürgen, et. al. **Enzyklopädie Philosophie und Wissenschaftstheorie.** Vols. 1 and 2: Mannheim: Bibliographisches Institut-Wissenschaftsverlag, 1980, 1984. Vols. 3–4: Stuttgart: J. B. Metzler, 1995–1996.

See entry 175.

742. Newton-Smith, W. H., ed. **A Companion to the Philosophy of Science.** Malden, Mass.: Blackwell, 2000. 576p. (Blackwell Companions to Philosophy, 18).

Provides encyclopedic, alphabetically organized treatment of philosophy of science in both its contemporary guise and, to some degree, its historical development. Articles range from 3 to 20 pages in length. Their topics range over comprehensive philosophies of science (descriptive/normative accounts of the nature and aims of science, for example, logical positivism, logical empiricism, realism and instrumentalism); philosophical problems surrounding specific aspects of scientific methodology or practice (e.g., explanation, induction, inference to the best explanation, observation and theory); philosophical issues raised by particular scientific disciplines or subject areas (e.g., biology, computing, quantum mechanics, social science); and philosophically problematic concepts used in substantive scientific discourse (e.g., causation, laws of nature, reduction, and space, time, and relativity). There are also biographical articles on 20 leading thinkers who shaped the modern Western conception of science, whether philosophers (e.g., Locke, Hume, Mill), practicing scientists (Galileo, Darwin, Einstein), or both (Descartes, Leibniz, Mach, and, arguably, Newton), or who count among the handful of most influential figures in twentieth-century philosophy of science (e.g., Feyerabend, Kuhn, Popper, Quine). Includes an index.

A new two-volume English-language work to be titled *The Philosophy of Science: An Encyclopedia* has been announced by Routledge. Edited by Sahotra Sarkar and Jessica Pfeifer, this shows promise of being even more comprehensive and detailed than the Blackwell Companion described previously. It will feature both topical and biographical entries. Some early notices indicated publication in spring 2004, but at this writing in November 2005 the work has not yet appeared and no revised projection is available.

743.   Seiffert, Helmut and Gerard Radnitzky, eds. **Handlexikon zur Wissenschaftstheorie.** Munich: Ehrenwirth, 1989. 502p.

About 100 articles, from *Abstraktion* to *Wissenssoziologie,* cover the philosophy or theory of *Wissenschaft*—a concept lacking an exact equivalent in English and somewhat variable according to context, but often used, as here, to encompass both the natural sciences, or *Naturwissenschaften,* and so-called *Geisteswissenschaften,* "human sciences" or "human studies," including, for example, history, sociology, economics, and linguistics. Articles address broad issues concerning the nature and methods of knowledge in these domains (e.g., *Erkenntnistheorie, Methode, Sozialwissenschaften, Wissenschaftsgeschichte*); the nature and methodology of specific disciplines (e.g., *Geschichtstheorie, Handlungstheorie, Mathematik, Semiotik*); schools of thought (e.g.. *Marxismus, Positivismus, Pragmatismus*); and major concepts, methodologies, controversies, and so forth (e.g., *Dialektik, Induktion, Modalität, Szientismus, Teleologie*). Both the bibliographies accompanying each article and selected bibliography of core literature at the front emphasize German-language sources almost but not quite exclusively. Contributors include a number of scholars prominent in (though not necessarily outside) Germany but also a few names familiar in Anglo-American philosophical circles: for example, Karl Popper (on *Falsifizierbarkeit*), Paul Feyerabend (on *anarchische Erkenntnistheorie, Rationalismus,* and *Relativismus*), and John Eccles (on *Geist-Leib-Problem*).

744.   Turner, Bryan S., ed. **The Blackwell Companion to Social Theory.** 2nd ed. Malden, Mass.: Blackwell, 2000. 570p. (Blackwell Companions to Sociology).

This *Companion* is concerned not so much with the content of social theories as with metalevel philosophical theories about the nature and aims of social science and analysis of social phenomena. William Outhwaite addresses this concern in broad terms in chapter 2, "Philosophy of Social Science." Other chapters explore specific viewpoints or positions, some of which are largely internal to sociology or the social sciences generally (e.g., Rational Choice Theory, Systems Theory, Symbolic Interactionism), while others are associated with wider philosophic or intellectual movements such as Phenomenology, Structuralism, Feminism, Postmodernism. Though not squarely in the category of "reference work," this *Companion* provides a useful thematic survey, with extensive bibliographies, of twentieth-century and particularly recent developments in this field.

745.   Warburton, Nigel. **Thinking from A to Z.** 2nd ed. London: Routledge, 2000. 150p.

This handy work covers informal logic in the widest sense of the term, and casts its net even wider to encompass other dimensions of critical thinking. Warburton's introduction identifies four principal types of entry: (1) "those which deal with common moves in arguments such as the *companions in guilt move*"; (2) "those which focus on seductive

reasoning errors such as the *correlation = cause confusion* and the *Van Gogh fallacy*";
(3) "entries on techniques of persuasion and avoidance, such as the *no hypotheticals move*
and the *politician's answer*"; and (4) "those which examine psychological factors which
can be obstacles to clear thought such as *wishful thinking*" (p. ix). Given the largely nega-
tive cast of this typology, it is worth adding that topics covered include not only bad forms
of reasoning or arguing but also sound moves and argument forms, such as counterexample
and Ockham's razor. Entries typically provide a short explanation followed by examples.
Entry terms show a preference for "the most memorable names" (p. x), and traditional
Latin designations are usually cross-referenced to their nearest English equivalents: *modus
ponens,* for instance, to "affirming the antecedent."

The second edition has 16 entries that were not in the first (Routledge, 1996).