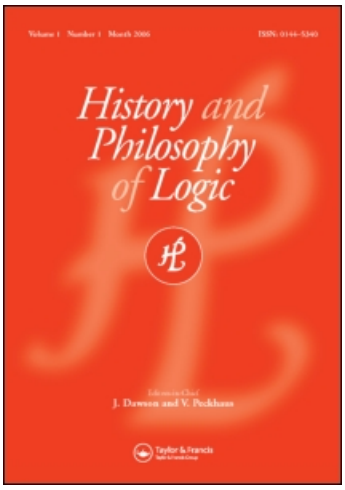

History and Philosophy of Logic

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Book Reviews

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Book Reviews

History of Logic

Al-Farabi's commentary and short treatise on Aristotle's De interpretatione. Introduction and translation from Arabic by F. Zimmerman. Oxford: Published for the British Academy by Oxford University Press, 1987. (Classical and Medieval Logical Texts, Part III.) clii + 287 pp. of English. £22.50 (paperback edition).

Reviewed by Sari Nusseibeh, *Department of Philosophy, Birzeit University, Birzeit, Israel*

I

This edition (the first hardback edition appeared in 1981) finally makes available an eminently scholarly work to scholars of modest means, especially to scholars of Arabic logic and the history of logic. This is not simply a translation of the two (long and short) commentaries of Al-Farabi (d. 950) on Aristotle's *De interpretatione* (complete with indices of Arabic and Greek words, a general index, and appendices on manuscript readings); it is also a very thorough reading and study of the historical and philological evolution of Aristotelian (and especially Christian) commentators leading up to the Arabic tradition, with a systematic critique of such 'classical' theories on the transmission tradition as that provided, e.g. by M. Meyerhof (Von Alexandria Nach Baghdad; p. ciii). The author's linguistic facility with the relevant languages (including Syriac, Arabic, Greek and Latin), as well as his knowledge of pre-Islamic philosophical tranditions, makes this an invaluable reading of the commentaries. Drawing on some manuscripts not previously consulted for the existing Arabic edition, as well as on earlier commentators, the author/translator is enabled to make highly reasonable educated guesses or readings where the text may seem corrupt or incomplete. The result is a smooth reading and translation, with constant cross-references to the Aristotelian original.

However, the introduction to the texts goes far beyond the strictly etymological domain; it is a very incisive treatment of some of the basic elements of the transmission tradition, with an attempt at a fairly precise delineation of Al-Farabi's place in the wider context of the Christian Aristotelian tradition in Baghdad. The introduction also addresses the indigenous intellectual context in which al-Farabi lived, and his interaction particularly with the grammarians and dialecticians (*mutakallimūn*) of his time. (The author's conclusion on p. cxxxviii that al-Farabi suffered from 'an alienation from Muslim Arab scholarship' is one that can probably be made of many a philosopher *vis-à-vis* the intellectual climate in which he lives.) Given the prominently linguistic basis of *De interpretatione*, this interaction sometimes found expression in disputations on logical and natural languages, or the extent to which a logical language can be independent of, and superior to a natural language. In part, the disputations in question almost provide a historical

antecedent to the problem of 'translatability', which has preoccupied such contemporary philosophers of language and logic as W.V.O. Quine.[1] Presumably because of the very wide range of topics broached in the introduction, the reader is merely provided with a taste, rather than with a full analysis of the problems involved in this context.

II

Some readers might feel that the excellence of the textual and etymological treatment tends on occasion to turn into an obsession that can aberrate, perhaps even undermine a fair or objective asessment of al-Farabi's individuality as a logician and a philosopher. Zimmerman's pronouncement that al-Farabi 'no doubt produced some new ideas' (p. xxxv) has a slighting ring about it. This, together with various other remarks about him 'tendentiously distorting facts' (p. cvii), or 'falling victim to multiple confusion' (p. xxx), etc., exudes an air of condescension, making the reader feel that the treatment is somewhat unsympathetic. Indeed, between the pronouncement that 'al-Farabi's technical language is not self-explanatory' (p. li) and the conclusion that 'students will find most of the clues to the understanding of his concepts, not in Arabic usage and etymology, but in the language of the Greek tradition' (p. lii), there must be a very wide gulf which the author seems to cross all too easily. Even if the first pronouncement were true (which is highly questionable), in order to justify the second statement a far more rigorous analysis of al-Farabi's logical works would need to be undertaken.

An example of what was called above an excessive etymological obsession (Greek-Arabic) is the author's reference to al-Farabi's use of the word '*muḥassal*'. The author here claims (p. cxx) that 'to put it bluntly, we only know that *muḥassal* is supposed to mean "definite" because it translates "ωρισμενος"'. However, one would have thought that anybody with a basic understanding of logic and no understanding of Greek, could not fail to understand the meaning of this term as it is used by al-Farabi, in just the same way that a modern student finds it possible to understand what 'instantiation' means in an English logical textbook. More generally, while it is certainly necessary and useful to trace the Greek 'equivalents' of the Arabic words (e.g. ﻟ.), this excercise should be regarded merely as a first step in the attempt at understanding the meanings of those terms in the context of the logical works themselves, rather than as sufficient means of determining those meanings. After all, if one hardly takes it as sufficient when two philosophers use the same word in one language to conclude they mean the same thing, how much more careful must one be when translation and two (or more) languages are involved?

A related (Arabic-Arabic) critique can be applied to the author's 'dissatisfaction' with al-Farabi's use of unconventional terms (e.g. *gawl* as opposed to *jumlah* for 'proposition' or 'statement' (p. cxxx)—a practice for which he says 'no excuse exists'. Actually, it is arguable that it is precisely because of the grammarians' well-established definition of 'jumlah' ('sentence'), that another word would have seemed better for introducing the logical concept of 'statement'. This certainly

1 Unfortunately, the author's treatment of the topic here surprisingly leaves out one of the better-known systematic epistles by Yahya b. Adi in defence of the independence of the rules of logic from those of grammar, published in Aleppo well before the first edition of this work appeared. A related topic is the interesting discussion in the context of predication arising from the absence in Arabic of the copula (pp. xxxvi *ff*).

seems to be the case in present-day Arabic classes of introductory logic, when one tries to set apart the logical usage from the well-established grammatical usage of 'sentence'. Once again, one would have thought that a full reading and understanding of medieval Arabic logical texts is sufficient for understanding the 'logical jargon' which was used—where 'jumlah', incidentally, also has its distinct role (e.g. sometimes used in referring to person, or any assemblage of parts). One feels that a full understanding of such 'jargon' might have saved the author some tortuous explanation (p. xcviii) of why the word '*ba'd*' is on occasion better translated as 'one'—the word is extensively used to mean 'at least one' in medieval Arabic logical texts, in the same way that 'some' is used in English logical texts.

The occasional tendency to misconstrue the nature and limitation of the etymological exercise, and sometimes to cross all too readily from the realm of strict scholarship to the domain of sweeping generalisations, can sometimes seem almost offensive—as when the author announces that, in his view, 'there is little in the logic of Avicenna that is not foreshadowed in that of al-Farabi' (p. lxxxiv, n. 2). Many experts on Arabic logic would find this statement highly dubious, to say the least. Incidentally, given the author's general assessment of al-Farabi as being little more than a mouth-piece for the Christian Aristotelian tradition of Baghdad, the reader cannot but come out with the impression by extension that, in the author's view, there is hardly an indigenous or original substance in medieval Arabic logic—a view which requires substantiation.

III

Finally, a brief comment on Islam. Although the author commends the freedom of interaction between philosophers of different religions in Baghdad (preferring to ascribe it, rather oddly one feels, to what he calls 'Nestorian humanism': p. cxii), he nonetheless claims that al-Farabi's philosophical project was to create an *Islamic* philosophy (p. cx, his italics). But this would seem inconsistent with the reference he makes to another of al-Farabi's works (p. xliii, n.2; p. cxii) where al-Farabi quite clearly makes the point that all religions are reflections of the universal truth of philosophy, implying that it is the latter which is the measure of the degree of truth of different religions. If anything, this would seem to indicate that al-Farabi took an almost condescending view of religions (including Islam)—thus his derogatory remarks on dialectics (*kalām*) and jurisprudence (*fiqh*) (pp. cxiii *ff*)—preferring to consider himself a student of a 'higher' universal science (the reader may be referred to the works of Muhsin Mahdi on the subject). Indeed, as the author himself states (p. cxiii), the closest thing to an Islamic philosophy in that period is probably the discipline of kalām. There is no reason why one cannot take the simple view here that al-Farabi was, first and foremost in this context, a student of philosophy itself, believing it to contain the ultimate truths, and studying it with the only tools available to him at that time. Such an attitude would certainly have distinguished al-Farabi from some other philosophers of the period, and primarily from Avicenna, who took religious truth rather more seriously.

On the whole, however, criticisms such as those above, pale next to the scholarship exhibited in this work. It remains an indispensable enrichment to the field of study of Arabic logic particularly, and of the history of logic more generally.

JOHANN ANDREAS SEGNER, *Specimen logicae universaliter demonstratae. Appendices: Two dissertations De syllogismo*. Edited by Mirella Capozzi. (Instrumenta rationis. Sources for the history of logic in the modern age, volume 5.) Bologna: Editrice CLUEB, 1990. clxxii + 281 pp. 85 000 Lire.

Reviewed by GABRIEL NUCHELMANS, *Van Polanenpark 180, 2241 RW Wassenaar, The Netherlands*

Johann Andreas Segner, born in 1704 at Bratislava, studied medicine, mathematics and philosophy at the University of Jena. There he also started his academic career as an extraordinary professor of philosophy. In 1735 he became a full professor of mathematics and physics at Göttingen. From 1755 until his death in 1777 he taught the same subjects at Halle. His interest in logic was limited to the first phase of his teaching activities. In 1732 and 1734 he was *praeses* in debates concerning two dissertations *De syllogismo*; which means that he himself had composed the text that was discussed with a respondent. The ideas put forward in these dissertations were elaborated more fully and systematically in his only other contribution to logic, the *Specimen logicae universaliter demonstratae*, published at Jena in 1740 (250 years before the present book). These three works have now been photographically reproduced: first the *Specimen* (pp. 3–195), then the two dissertations (pp. 199–222 and pp. 225–264).

Segner's logic may be summarily characterized by the following salient features. The key-stone of his intensional syllogistic is the notion of containment between ideas. By means of it five fundamental relations between ideas are distinguished. Ideas are opposite if each of them contains the negation of the other. If ideas are not opposite, they are consentient. Two consentient ideas are identical if each of them contains the other. If they are not identical, they are diverse. Diverse ideas are of two types: either one is superior and the other inferior, or they are coordinate, in the sense that neither of them may contain the other. Negative propositions are treated as affirmative propositions with a negated predicate. So all propositions are affirmative statements about relations between ideas. They are true if they express the relation that actually obtains between the ideas concerned and false if they do not; irrespective of whether the subject denotes an existing entity or not. In order to distinguish the several possible relations between ideas, Segner borrows symbols from mathematics. With their help he is able to mark differences between propositions that are covered up by the vagaries of natural languages: for instance, between universal propositions in which the predicate is identical to the subject and universal propositions in which the predicate is superior to the subject (that is, contained in it, but not containing it). On this basis he devises a calculus of the syllogism that is independent of the traditional presentation of figures and moods. This syllogistic forms the main subject of the *Specimen*; minor sections are devoted to arguments that hinge on the operations of composing and abstracting ideas, and to reasonings with conjunctive, disjunctive and conditional propositions.

Segner's texts, then, are typical of a current in logic that highlights arguments which are composed of essential predications concerning the timeless relations among elements of conceptual systems, and that attempts to construct a theory of such arguments with the aid of mathematical tools. In so far as this re-edition makes these texts more accessible, it is welcome. But the value of this book is considerably enhanced by an introduction of no less than 162 pages. After extensive and

well-documented information about Segner's life and work, the state of logic in Germany and particularly at Jena in the first decades of the 17th century, there follow thorough analyses of the two dissertations and the *Specimen*. The introduction is concluded with an attempt to determine Segner's position with respect to Leibniz's programme and with some data concerning the fortune of Segner's logic in later years. All in all, this preliminary monograph is a very competent and illuminating contribution to a better knowledge of a lively period in the history of logic that fully deserves this attention.

M. Borga, P. Freguglia and D. Palladino, *I contributi fondazionali della scuola di Peano*. Milano: Franco Angeli, 1985, 257 pp. No price stated.

Reviewed by Francisco A. Rodriguez-Consuegra, *Department of Philosophy, Institute S. Vilaseca, 43205 Reus, Spain*

There must be a strong reason to publish—without apologies—a review more than five years after the publication of a book. Actually, there are several relevant reasons. First, the important contributions by Peano and his school to the foundations of logic and mathematics are hardly known even for logicians, mathematicians and philosophers interested in foundations; probably because they were written in Italian or French and were soon superseded by Russell's and Frege's. Besides, there is very little secondary literature, and the one available is mostly not very good and generally difficult to find. Last, there is an increasing trend to rewrite the history of foundations, and one of the reasons is precisely the need to relocate the endeavours by Peano and his school in order to recognize for them a number of achievements which are usually attributed to others (Frege, Hilbert, Russell). A practical illustration to these threefold reason could be the fact that the present reviewer, who has several publications closely related to Peano and his school and a long chapter devoted to it in print (*The mathematical philosophy of Bertrand Russell: origins and development*, Boston and Basel: Birkhäuser), became aware of this book only a few months ago, and has obtained a copy thanks to one of the authors (Professor Palladino).

The first thing to say is that the book is very well organized. After a preface by E. Agazzi, there are three long chapters and an appendix, respectively devoted to logic and methodology (65 pp., by M. Borga); foundations of arithmetic and analysis (98 pp., by D. Palladino); foundations of geometry (63 pp., by P. Freguglia); and the polemic between Peano's school and the school of algebraic geometry (appendix, 20 pp., by Palladino). Besides, every contribution contains many selected key passages by Peano and others, and all of them are followed by good bibliographies generally composed of sections devoted to every of the members of the school whose writings are considered or mentioned, plus a general section with secondary literature. In the following I shall say something about each chapter and finish with a general judgement.

Borga's account of logic and methodology starts by exposing the antecedents in the algebraic logic, then the progress till the first axiomatizations by Peano and further developments by other members of the school. After that, he explains us Peano's conception of axiomatics, devoting a section to discuss several interpre-

tations of implicit definitions, which is very interesting to correctly understand the relationship between Peano, Pasch, Frege, Hilbert and Pieri. Finally, a brief account of Padoa's metatheoretic methods and Burali-Forti's antinomy is given. In the meantime, several misunderstandings about Peano are discussed and clarified, like the usual one that he did not care about demonstrations. Unfortunately, there is no discussion of definitions by abstraction, which can be seen also as implicit (although there is something about the topic in the next chapter). Also, there is no discussion of the origins of quantification either, which is more serious because of the problem of the priority (Peirce, Frege).

Palladino's contribution is mainly devoted to Peano's account of natural numbers, with long and clear expositions of *Arithmetices principia* (1899) and 'Sul concetto di numero' (1991), which are followed by good comparisons with the accounts by Dedekind, Frege and Russell. The next sections are devoted to explain Peano's construction of integers, irrationals and reals, and the two last ones consider, respectively, Peano's contribution to mathematical analysis (which is many times neglected) and the development of the several editions of the *Formulario* (the collective book where the main results of the school were published). To point out some lacks or problems, I will say: (i) there is no account of the important logicist elements which can be easily found in Peano and other members of the school, especially of Burali-Forti's—successful—endeavours to reduce Peano's arithmetical primitives to logical notions; (ii) nothing is said about one important achievement by Pieri: he invented the method to transform (implicit) definitions by abstraction into (explicit) nominal ones (see my article in this journal, **8** (1987), 141–169), which made possible for Burali-Forti to start a logistic programme, *then* for Russell to develop this programme (independently of Frege).

Freguglia's chapter gives us a useful account of the two traditions which are developed in Peano's geometrical works: the geometrical calculus and the axiomatic foundations of geometry. Also, he devotes interesting sections to make comparisons between Peano and Bellavitis, Grassmann and others, on the one hand, and Burali-Forti, Pieri and Hilbert, on the other. This chapter is more technical than the two others (perhaps too much for the general reader), but important historical elements are discussed and emphasized, as for instance the clear priority of Peano and Pieri regarding the first formal axiomatizations of geometry, or the precise dependence of Peano with respect to Pasch.

As a whole the book has limited goals, but they are reached doubtlessly. Expositions, rather than discussions, are the main recourse of the authors, but on this topic brief and clear expositions are really needed. Originality in the interpretations of the historical sources cannot be found here, but this would be important only for the specialist, who is not the reader to whom the book is destined. To finish, I think the book deserves a better knowledge, including—perhaps with some improvements—a translation into English.

F. CAVALIERE, *La logica formale in Unione Sovietica. Gli anni del dibattito 1946–1965*. Firenze: La Nuova Italia Editrice, 1990. ix + 140pp. Lire 42000.

Reviewed by G. LOLLI, *Dipartimento di Informatica, Università di Torino, Corso Svizzera 185, 10149 Torino, Italy*

Since 1917 logic in the U.S.S.R. has been involved in deep ideological issues; its very right to exist has been for long in question, in the context of the ongoing class struggle, and in the shadow of the alleged more progressive dialectical thought. As a general rule, in the aftermath of revolution, mathematical logic was at best recognised as a minor chapter of mathematics, sharing with the latter the always impending danger of idealistic deviation. On the other hand, formal logic was being identified with traditional syllogistics; on the basis of some not unambiguous statements by Engel and Lenin, it was viewed as a restricted or metaphysical study of psychological laws, unable to grasp the movements of thought and reality: in short, it was a bourgeois inheritance.

Official opinions have changed however over the years, and today, according to the author, mathematical logic is recognised as an acceptable philosophical discipline (as contrast to a mere chapter of technical mathematics); it is identified with the modern form of formal logic, and its problems and techniques are considered worthy of pursuit and use.

This book focuses on the critical moments which have brought forth the new appraisal of logic, namely the controversy in 1950–1951 in *Voprosy Filosofii*, from which the new phase opened, and another one in 1964–1966; but it offers also as background an essential history of previous events. The author has probed directly into the original sources, to which she had access in the Lenin Library and in the library of the U.S.S.R. Academy of Science in Moscow. Long excerpts are translated for the first time in a western language; they allow us to make the acquaintance with many scholars, to appreciate the different positions and their varied arguments (V. I. Cherkesov, A. D. Aleksandrov, D. Spasov, B. M. Kedrov, F. Ja. Ostrouch, V. K. Astaf'ev, K. S. Bakradze, A. D. Makovel'skij, K. Fedin, G. G. Kungurov, V. I. Lozovskij, I. I. Os'makov and many others in the early 1950s, and E. Kol'man, I. S. Narskij and A. L. Subbotin later). This essay is quite an advance with respect to previous available sovietology, such as J. Hanggi's *Formale und Dialektische Logik in der Sovietphilosophie* (Winterthur, 1971), or a few translated papers by V. I. Cherkesov.

Duly recorded in the book are the first attacks on mathematical logic and idealistic set theory in the 1920s; the establishment of the official negative position regarding formal logic; and the occasional work by A. N. Kolmogorov, D. A. Bochvar, P. S. Novikov, A. A. Markov, and a few others in the 1930s and 1940s. Then came Stalin's surprising intervention in 1946 in favour of logic and its teaching, and his subsequent essay on linguistics, declaring it a partially class-independent discipline; they are seen as consistent with his politically oriented project of a more dogmatic version of Marxism, a project in which a deflation of dialectics was instrumental.

In the ensuing open controversy several thesis were mutually opposed and argued for: whether formal and dialectical logic are two levels of a same science; or different from a methodological point of view, with formal logic more akin to grammar; or different stages in the historical development of the science of thought,

or sciences with different objects. At the same time this has been a discussion on dialectics, whether it is a logic, or *the* scientific method, or a general theory of knowledge.

One does not clearly see a winner, but it is a fact that in the 1950s mathematical logic could flourish, also at the universities, while the recognition of the importance of formal research methods won more and more supporters. At this point the new debates focussed on the issue whether formal logic is mathematics or philosophy, more similar to our debates on mathematical *vs* philosophical logic. Some authors suggested the identity between mathematical logic and formal logic and its strong relationship with philosophy; others (A. K. Maneev and A. A. Vetrov) regard mathematical logic as too restricted to mathematical problems and ask for a symbolic logic with wider applications.

The final acceptance of formal logic put on a new basis the traditional questions of dialectics, which are now being tackled also with formal techniques: for example, Ju. A. Petrov developed a temporal logic with infinitesimals to account for motion. A final well documented controversy (mostly but not only in *Filosofskie Nauki* in 1962–1964) refers to contradictions; the positions of Soviet scholars were again varied, and the majority did not appear to favour a logic of contradictions; distinctions were proposed between logical contradictions in thought and dialectical antinomies; and many thought that the logic to study contradictions should itself be a non-contradictory one (I. S. Narski and A. A. Zinov'ev).

Logic and Ontology

William S. Hatcher, *Logic and logos. Essays on science, religion and philosophy*. Oxford: George Ronald, 1990. x + 147 pp. £4.50/$9.50.

Reviewed by D. P. Henry, *Department of Philosophy, The University, Manchester M13 9PL, England*

Five loosely-connected essays are presented in this book. In the first it is argued that Platonism, in the sense of a theory countenancing the reality of objective abstract 'forms', is justifiable on pragmatist grounds. Thus the availability of fruitful theoretical models, their communicability in abstract terms, and the powerful applicability of mathematics, are said to ground the practical usefulness of such a supposition.

It is in the second essay ('Myths, models, and mysticism') that categories replete with dialectical traps of the worst sort are introduced. Thus 'reality', it is said, may be 'subjective' or 'objective', conscious or unconscious, and visible or invisible. Exploitation of these then relies on the slanting of their senses so that, for example, one has a sense of 'internal' which must exclude my spleen. I mention this because this organ is internal and unconscious, in quite ordinary senses of these words, and yet we are, as far as I can understand, supposed to exclude it from the unconscious region of 'subjective reality', presumably on the ground that I may become

conscious of it, (in various pathological states) and it is potentially visible (which makes it objective, and hence non-subjective). This sort of mixture is, I suppose, familiar enough, and attention need not have here called to its conceptual convolutions, were it not for the fact that the obscurities of mysticism are said to be connected with the wooziness of the invisible and unconscious departments of 'reality'. Finally comes a version of Locke's fatal adoption of 'ideas' as the objects of thought ('it is these mental representations that are really known', p. 23).

We are then launched in the direction of mysticism, since it attempts to experience 'invisible reality', knowledge of which, it is alleged, is also the aim of scientific method (pp. 46–47). Since the mystics who were founders of revealed religions provided true theories about invisible reality (p. 43), notwithstanding the myth-making propensities of their recipients, the scientific and mystical may happily join in a synthesis grounded on progressive relevations, the theory of which turns out to be a by no means novel anthropomorphic historicism (pp. 51–58) comprising bits of unattributed Herbert Spencer (pp. 53–54), although the credit is here given to Shoghi Effendi, of the Bahá'í Faith.

By this stage certain fragments of the theory of collective classes (in the sense of Leśniewski) are beginning to appear, as when 'the collective organism that is mankind' surfaces on p. 58, very much in the style of John Wyclif's extension of the notion. This theory is now prolonged in a salient fashion, with 'Avicenna's idea of considering a collection of entities to be a single composite entity' described as 'an interesting (and in some ways exciting) anticipation of developments in modern logic' (p. 65). Such a theory in fact thrived from Aristotle onwards, and especially during the Middle Ages in the Latin West: its present relevance, however, lies in Avicenna's having used the concrete collection of all caused entities as the foundation whence to infer its uncaused cause, thereby avoiding the 'pitfalls of the infinite regression argument of Aristotle' in proving the existence of God (pp. 63–65). This much is clear enough, at least in intention, but the subsequent discussion becomes difficult to follow, not least because it is at times unclear whether collective class theory or set theory is being brought to bear. Thus I find quite unintelligible the doubts as to whether collective classes are entities (pp. 65–66), as well as the alleged difficulties of their self-predication (p. 67). It is also clearly out of place to then switch to irrelevant set-theoretical difficulties (p. 68), which accompany the apparent identification of collective classes and sets (p. 70). I would also take issue with the p. 71 thesis that 'Basic to all scientific activity is the *causality principle*', since it is precisely contemporary science's non-use of this notion which has caused certain well-known philosophical lamentations about the 'eclipse of cause'. Still, the systematic treatment of cause and composition (pp. 73–78) might be a useful broaching of the subject, were it not for the continued doubt about whether sets or concrete collections are in question. In particular, I would hesitate to concede that the mixture of the two on p. 77 gives 'a set-theoretical definition of the causality relation'. It is only set-theoretical in the sense that the language of set-theory provides the framework for the definition, with 'universal cause', denoted by 'E', as one of the extraneous foundational constant terms.

A similar observation applies to the next chapter's 'logical solution to the problem of evil'. Although it is replete with expressions instantiating predicative and relational logical forms, this scarcely improves the quality or cogency of the arguments, especially when the correlations between the symbolism and the accompanying ordinary-language translations are suspect at critical points. Thus it is

absolutely vital, if one is to analyse 'if it is evil, then it is not good' (p. 83), that some sort of nominal negation should be available, and used for the 'not-good' part of the analysis. But only propositional negation is in evidence in the text, so that one in effect gets 'it is not that x is good' as the sense of the unsatisfactory symbolic counterpart of 'it is not-good'. This will not do, since the counterpart holds when x does not exist, and we are hence in danger of making all non-existents into evils. The pervasive analytic unsatisfactoriness of the Russell-Quine quantification here used, with its restriction to non-empty substituends for its nominal variables, is hence also evident. Since the availability of the purely nominal negative forms is quite vital to this and to any discussion of the problem of evil, it is evident that the use of this sort of quantification is a hindrance, rather than the help which its chapter-heading's mention of a 'logical solution' suggests. The upshot of the chapter is not, however, devoid of interest, and can simply be expressed as claiming that if God is credited with the creation of things having diverse grades of goodness, so that evil becomes invariably relative, then the problem of (moral) evil is solved. For it is better than man should be created with moral choice than without. There is, incidentally, as far as I can see, no sign of the usual distinction between physical and moral evil in this chapter, with the result that the former is completely ignored.

The final chapter extends the correspondences earlier alleged between a pragmatist theory of science and the tenets of the Bahá'í Faith. Practical acceptance of esoteric specialist observational claims, based on a theory's actually working, is in both cases the basis of truth. Place the revelations of the founders of the great religions within this same framework, and the analogy is complete (pp. 105–106, 109–110, 116). Unfortunately, this sort of suggestion also makes true the various background theoretical mishmashes of truth-claims underlying the powers of Hitler and Stalin at the zeniths of their influences. The rest is scarcely novel. Indeed, the aim of 'the unification of mankind as a whole' (p. 116) is a word-for-word repetition of Dante's description of the universal monarch's mission in his *De Monarchia*. The use of scientific method in the development of spirituality (p. 119) was a 17th-century fashion, echoed in Descartes's *Discourse on method*. The recurrence of the organic analogy (p. 118), the favourite rhetorical weapon of so many political fiends, is neither novel nor healthy. Claims to have given 'the ultimate resolution of the religion-science opposition' (p. 122) are at least as old as Aquinas, and have not so far shown any tendency to have the unity of mankind as their consequence, as it is here quite gratuitously claimed they inevitably should have (p. 122). Hence although the book's general project is undoubtedly most laudable, some of the means it outlines would appear to be either not new or somewhat suspect. Whether this really matters for holders of the pragmatist theory of truth herein espoused is a question which such theorists may care to consider.

E. J. Lowe, *Kinds of being: a study of individuation, identity and the logic of sortal terms*. (Aristotelian Society series, volume 10.) Oxford and New York: Basil Blackwell, 1989. £25.00/$50.00.

Reviewed by Francis Jeffry Pelletier, *Department of Philosophy, University of Rochester, Rochester, N.Y. 14627, U.S.A.*

In the 1950's, in 'underground' writings and lectures given at various schools in the U.K., a certain logico-epistemologico-ontological doctrine was born. Arguments continue over the paternity (and even the maternity) of the doctrine—some opinions reaching back to Aristotle, others to Locke, and yet others to various shadowy characters in Oxbridge. The doctrine received its first—and possibly still the best—public exhibition in Strawson *1959*, where it was christened 'sortal predication'. A louder but less thoughtful relative was also born at about the same time—again with the same obscurity of lineage—and received its public christening in Geach *1962*, where it was dubbed 'relative identity'. A later manifestation of these doctrines occurred in Wiggins *1967* and in his better-considered but less exciting *1980*. Although the two doctrines are related (indeed, they may even share a parent), they *are* different doctrines. And just as when writing about one of a pair of famous related people it is not always a good idea to dwell on how one influences the other, or whether our perception of the one should colour (or be coloured by) our perception of the other, so too it probably is salutary to discuss 'sortal predication' in isolation from 'relative identity' (Feldman *1973* makes the suggestion that Sortal Predication all along had multiple personalities and was quite unsure of its own identity).

A sortal concept is a (mental? objective?) concept of a *kind* or *sort* of individual. A sortal predicate is a linguistic item which is correlated with a sortal concept. In this view there is no such thing as an individual *tout court*; instead, individuals come already pre-packaged as individuals-of-the-F-type (where F is a sortal concept). Such a theory is in contrast to those which take the notion of 'bare particular' or 'individuals without qualities' as basic. These latter theories hold that one should imagine ordinary individuals as being a bundle of qualities plus something holding them all in one place—this 'something' being the bare particular. One is seduced into this view by starting with an ordinary object, then considering it as an object which has a certain colour, then as an object which has a certain shape and colour, . . ., etc. One continues this 'abstraction' until one contemplates an object which has properties F, G, H, . . . (where these are *all* the properties of the object). As the English description would lead us to believe, there is still an object here—that object which has all the properties. And this is the bare particular: the object which serves as coat-hanger upon which all the properties are hung, but which has no properties of its own nature. This view is often said to be implicit in any ontology derived from a theory embracing the semantics of classical first-order logic. For, it is said, in that theory the quantifiers are assumed to range over such bare particulars. Consider a quantified sentence such as $\forall x(Fx \rightarrow Gx)$ and read it carefully: 'For each x, if x is F then x is G'. One sees that the quantifier phrase itself ('for each x') only makes sense if the variables range over bare particulars—or so many people have argued. The objects picked out by the variables have no properties intrincisally but only insofar as the sentence goes on to characterize the x's further.

In contrast to the preceding, the present doctrine holds that there are no (bare particular) individuals, but only individuals-of-a-sort; thus, stating what individuals one has in one's ontology is the same as stating what sorts one admits. In the present work, Lowe allows the individuals to be either concrete or abstract, and either natural or artefactual; and he allows sortal predicates to include mass terms ('water', 'furniture', 'spaghetti') as well as count terms ('person', 'house', 'noodle')—although these decisions may go against certain understandings of the doctrine from past generations. The fundamental linchpin of the present doctrine is that sortal concepts come with, or are defined by, or presuppose, something called 'criteria of individuation and identity' (and therefore the sortal predicates contain or imply or presuppose semantic principles of individuation and identity). These are principals which determine what counts as an individual instance of the kind or sort, and principles which give the conditions under which identity or diversity over time is determined for that sort. Some distinct sortal predicates—e.g., 'dog' and 'cat' perhaps—have the same criterion of individuation and identity. Therefore, says Lowe, it makes sense (is either true or false) to aver their identity or non-identity: 'Tabby is the same as Rover' is false and 'Tabby is not the same as Rover' is true (with the implicit understanding that Tabby is a cat and Rover a dog). But when the sorts have 'radically different' criteria of individuation and identity—e.g., as 'statue' and 'dog' have—then 'it makes no sense to identify an individual falling one of these concepts with an individual falling under the other' (p. 2). Such claims make one wonder about *non*-identity claims. Will they also 'make no sense'? Or will they be perhaps necessarily true? It seems to me that this issue is not adequately discussed in this work, even in the more technical Appendix to ch. 9—where we merely are warned against confusing sentential negation with predicate negation.

This minor difficulty having been mentioned, it should also be admitted that this work is overall quite a satisfying descendant that would do its grandparents proud. Nonetheless, one always wants to criticize the younger generation ('for their own good'), and so I will here raise what seem to me to be some shortcomings in this child. (Like adults in other situations, I will not offer any constructive suggestions—I shall merely *harumph* in the general direction of the problems.)

My main harumph is one which many philosophers of logic have directed towards this doctrine even as early as its very birth, especially when the doctrine is presented with pretenses (as the present work is—they even are advertised in its subtitle) to being not just an epistemico-metaphysical doctrine but also an alternative to classical first-order logic. Such an alternative logic, a 'sortal logic', was envisaged even in the earliest presentations (of Strawson, Geach, etc.); but it received its formal statement in Smiley *1962* and in the unpublished but widely read underground classic, Wallace *1964* (see also Wallace *1965*). This in turn was followed by other attempts such as Stevenson *1975* and Tennant *1977*, which, strangely, are not cited by Lowe. (And Lowe's two references to Gupta *1980* are to general issues concerning sortals, not to logical issues.) The flaw with them all, say both the classically-minded formal semanticists and the sortally-minded *non*-logicians, is that the logics constructed in this way are *precisely the same as* classical first-order logic. Any differences one detects are merely 'syntactic sugar', and the accounts produced are merely notational variants of classical restricted quantification theory—which of course is a mere notational variant of classical quantification theory. (See Hailperin *1957* for the restricted theory; similar remarks could be made about many-sorted logics (Wang *1952*), but I will just discuss the former theory.) In

restricted quantification theory we 'abbreviate' formulas of the form $\forall x(Fx \rightarrow Gx)$ and $\exists x(Fx \& Gx)$ respectively as $(\forall x : Fx)Gx$ and $(\exists x : Fx)Gx$. The latter formulas appear to have the syntactic unit 'quantifier phrase' (if F stood for 'dog', then the quantifier phrases would be 'every dog' and 'some dog'). But in restricted quantification theory this is *mere* appearance, for these formulas have precisely the same truth conditions as the original unrestricted formulas. Exactly the same formulas are theorems; exactly the same arguments are valid, after translation from one idiom to the other. And if one were to advocate restricted quantification theory as a sortal logic, one would be open to the charge of being fooled by the syntax. True sortal logic resides in restricted quantification theory exactly to the same extent that it resides in unrestricted quantification theory. Certain of the works cited earlier were quite pleased to be able to prove that there was an algorithm which would translate back and forth from their 'sortal logic' into restricted quantification theory. But this merely shows that they do not have a real sortal logic; instead they just have another notation for classical logic—their logic is no more a 'sortal logic' than is classical logic. And if one accepts the position outlined in the second paragraph of this review (that classical first order logic's variables range over bare particulars and thus any ontological theory based on the semantics of classical logic is committed to bare particulars), then one concludes that *none* of these alleged 'sortal logics' adequately represents the desired doctrine.

How does Lowe's logic fare here? This is a rather difficult question to answer without undertaking a more thorough metalogical investigation than is called for in a review. Still, it seems to me that nothing is allowed or prohibited in the formal system presented in Chapter 9's Appendix (with the provisos suggested in ch. 10: 'Complex sortal terms') which isn't in exactly the same state as in classical first-order logic. But there *is* a lot of syntactic sugar, and a lot of genuinely interesting points are made, especially concerning the distinction between 'dispositional' and 'occurrent' predication and how one should represent scientific laws. The resulting philosophico-ontological theory is interesting, but I believe that a thorough investigation will show that the logical aspects of this child in fact are due to a classical logician hidden in the closet.

I close with a speculation concerning the relationship between this philosophical doctrine of sortal predication and some children from other fields. It has been long recognized that certain kinds of predicates easily lend themselves to formulating natural laws (both laws of a formal and of a 'folk' type). This leads one to wonder whether the sortal predicates are exactly the ones from which 'real' natural laws are formed. Lowe explains the relationship between these two children in his chs. 8 and 9. But even more striking to me is what appears to be a close analogy between sortal predication and 'generic predication' as studied in linguistics and formal semantics (see, for example, Carlson 1980). 'Sorts' as used in the sortal logic literature and 'kind' as used in the genericity literature seem to be just two different names for the same thing; sortal predicates seem to be very closely related to generic predicates; and sortal predication seems to be akin to generic predication. Many of these similarities can be seen by comparing the claims made in Lowe's Chapter 9 with those in Krifka *et alii* (forthcoming). Another close relative must be the doctrine of non-monotonic reasoning as studied in artificial intelligence (for a survey see Reiter *1987*). Lowe in fact on p. 153 discusses the example 'Ravens are black', which is true despite the existence of non-black ravens. This is precisely the sort of example that is discussed in the non-monotomic reasoning literature, and Lowe's suggestions

remind one of the various ways that researchers in AI have sought to make sense of such cases.

It seems clear enough to me that a family reunion is called for here, and all the wisdom garnered in each field is distributed to the rest of the family.

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Logic in Epistemology

REINHARDT GROSSMANN, *The fourth way. A theory of knowledge*. Bloomington and Indianapolis: Indiana University Press, 1990. 312 pp. $35.00.

Reviewed by GEORGE ROUSSPOULOS, *Technical University of Crete, Chania 73 100, Greece*

Grossmann's book takes its departure from Vaihinger's commentary on Kant's Critique of Pure Reason, where the epistemological distinctions of rationalism and empiricism are conjoined with the ontological distinctions of realism and idealism. According to Vaihinger, Kant was capable of combining rationalism with idealism—rationalism being always connected with realism, and empiricism. The fourth way then, left out so far, was the combination of empiricism with realism; this is what Grossmann's book sets out to defend.

Grossmann's view of empiricism may strike some as radical, for it insists that we know numbers, set theory and logic by means of perception. Thus, he holds that the truths of arithmetic, set theory and logic ultimately rest just as much on perception as the truths of physics and other empirical sciences. His version of realism is also of a radical sort; for he holds that, in addition to perceptual objects, molecules and elementary particles, there are sets and numbers, and that these things do not depend for their nature and existence on mind. However, were one to concede that

numbers, sets and other abstract entities do exist, there remains the formidable task of determining what kind of stuff these nonmental entities are. Among traditional answers one would include the view that numbers are properties, or structures of certain kinds, or sets; but Grossmann claims that numbers form a category of their own: they resemble such things as 'all', 'some', 'no', etc., and so they are quantifiers. Although the term 'quantifier' is not without ambiguity, one usually thinks of it as nonsensible entity. Grossmann, however, defends the view that numbers qua quantifiers are sensible entities, and that there is no special intuition (Goedelian or Husserlian) that acquaints us with these abstract entities. Thus, Grossmann considers himself a realist/Platonist with respect to abstract entities and an empiricist with respect to how one knows these abstract entities.

Grossmann's strategy to effect the marriage between Platonism and empiricism depends on an analogy between colors and (small) numbers. Numbers and colors are abstract entities; and, numbers, just like colors, can be perceived. On the other hand, numbers and colors do not belong to the same category: colors are properties of individual things whereas numbers are quantifiers. In addition to that, while colors are presented to us through just one sense (they can be seen only), numbers are given to us through all of the senses (they can be seen, heard and felt).

The fourth way is divided in three parts: the first part is concerned with knowledge of the external world and perception, the second part deals with introspection and knowledge of our minds, and the third part deals with mathematical knowledge and perception again. This latter part is subdivided in two parts: historical observations and systematic considerations. In the historical section Grossmann is concerned with explicating Kant's basic distinctions of analytic-synthetic and *a priori-a posteriori*, and with Kant's philosophy of arithmetic. The author places a great deal of emphasis on Bolzano's notion of number and on Mill's philosophy of arithmetic. Many pages, however, are dedicated to logicism and Frege's philosophy of arithmetic; Grossmann has much to say in agreement with the Fregean ontology but he diverges from the Fregean epistemology. In the section dealing with systematic considerations he struggles with contemporary alternative philosophies of arithmetic such as the logical empiricists', Wittgenstein's, Gödel's and the model-theoretic one.

J. ETCHEMENDY. *The concept of logical consequence*. Cambridge, Mass. and London, England: Harvard University Press, 1990. vi + 174 pp. £19.95.

Reviewed by J. WOLEŃSKI, *Institute of Philosophy, Jagiellonian University, Grodzka 52, 31-044 Kraków, Poland*

This book offers a very strong criticism of Tarski's model-theoretic account of logical consequence. It consists of ten chapters: 'Representation semantics', 'Tarski on logical truth', 'Interpretational semantics', 'Interpreting quantifiers', 'Modality and consequence', 'The reduction principle', 'Substantantive generalizations', 'The myth of logical constants', 'Logic from the metatheory', and 'Completeness and soundness'.

Etchemendy's most important critical observations are that Tarski's account (1) 'does not capture, or even come close to capturing, any pretheoretic conception of

logical properties' (p. 6); (2) is based on wrong (interpretational) semantics; (3) 'will both *undernate* and *overgenerate*: it will declare certain arguments invalid that are actually valid, and declare others valid that in fact are not' (p. 8); (4) does not precisely determine the range of languages which the concept of logical consequence is to be defined for; and (5) is based on an arbitrary list of logical constants.

I find the objections (3)–(5) to be fully justified but (1)–(2) not. Etchemendy ascribes to Tarski the view that languages are purely syntactic items which are then arbitrarily interpreted; their semantic interpretation is similar to creating truth-tables for formulas of the propositional calculus. On Etchemendy's view, we need a representational semantics in which 'the class of models should contain representatives of *all* and *only* intuitively possible configurations of the world' (p. 23). I do not know whether Tarski's original semantics is representational or not, but I am quite sure that it is not interpretative in Etchemendy's sense. Tarski regarded languages as meaningful entities related to the world on empirical grounds. Perhaps this treatment is not quite satisfactory from the philosophical point of view (for we would like to know something more on the concept of meaning and the relation of languages to the world), but it should not be confused with semantics inspired by 'truth in a row of a truth-table'. Every piece of logical analysis can be easy blamed for more or less departing from ordinary intuitions or pretheoretic conceptions. To justify (1), one should (a) specify a pretheoretic concept of logical consequence, and (b) build a formal theory capturing data collected under (a). Since Etchemendy offers neither (a) nor (b), the objection (1) should not be stated by him at all.

A great merit of Etchemendy's book is it shows weaknesses of Tarski's account; his criticism is very penetrating and instructive. However, one should distinguish Tarski's account which we can derive from his writings from the Tarskian (or Tarski-style) account which consists in a continuation of his way of thinking about the concept of logical consequence and also other matters. This is an important point because it may happen that correct objections against Tarski's account are not justified towards the Tarskian account. I think that the concept of logical consequence is a case in point. Tarski did not believe in any strict borderline between logical and empirical concepts. On this view, the list of logical constant cannot be defined in a precise way. This is fatal for the concept of logical consequence for its relation to a definite stock of logical constants. But Tarski's view is by no means obligatory for us. We can restrict our interest to the first-order logic. Then we syntactically define logical constants by axioms for *Cn* (syntactic logical consequence). Now the model-theoretic (semantic) concept of logical consequence may be justified by the completeness theorem for the first-order logic. For the list of logical constants is established entirely independently of the model-theoretic definition of logical consequence, the procedure, contrary to Etchemendy, is not circular. To meet the question whether *Cn* well defines logical constants we can point out limits of maximal or ω-consistency strictly connected with usual logical constants. Finally, we observe with respect to the objection (3) that valid arguments are exactly those that preserve truth. I do not claim that this argumentation solves all problems. For instance, it assumes the equality 'logic = the first-order logic' which is recently questioned. However, I claim the outlined reasoning adds something new to Tarski's original account as well as improves it in some respects.

I recommend this book for everybody who is interested in philosophical problems of logic. It is full of very subtle observations and arguments which show that philosophising on logic is actually 'an unended quest'.

Shorter Notices

Unsigned pieces are written by the Editor.

Bernard Bolzano, *Las paradojas del infinito* (1851). Translated from the German by L. Felipe Segura. Introduction by J. Sebestik. (Collection *Mathema*.) Mexico City: Faculty of Sciences, University of Mexico, 1991. 163 pp. No price stated.

This is the first translation into Spanish of this now famous book, which gained virtually no reception upon its first publication in 1851, three years after Bolzano's death. Sebestik does not survey all aspects of Bolzano's considerations in his introduction but concentrates upon the proto-set-theoretical ideas. In preparing the translation use has been made of the editions made by H. Hahn (1920) and B. van Rootselaar (1975) (p. 29), although no special editorial notes have been added. The book is the first of projected book series allied to the journal *Mathesis* (Mexico), which publishes mainly on the history of set theory and of the philosophy of mathematics.

W. Stanley Jevons, *Pure logic and other minor works* (1890). Photoreprinted Bristol: Thoemmes, 1991. xxiii + 299 pp. No price stated.

This volume, which was published under the editorship of his follower R. Adamson and his widow eight years after his death, covers two different aspects of Jevons's work. The first comprises his main contributions to logic: his short book *Pure logic* (1863) in which he outlines his major modification of Boole's method of algebraising logic, together with a related paper on 'The substitution of similars' (1869); his paper of 1870 presenting his logical machine (unfortunately the predecessor of 1866 on the logical abacus was not included); and a study of 'numerically definite syllogisms' *à la* De Morgan together with Boolean applications to probability theory. The other part of the book deals with J. S. Mill's philosophy, including some concern with Mill's logical notions. As usual in this series of reprints, no editorial matter is furnished.

Felix Kaufmann, *L'infinito in matematica*. Translated from the German, with an introduction, by L. Albertazzi. Gardolo di Trento: Luigi Reverdito Editore, 1990. 297 pp. L. 32.000.

This work, by a Viennese thinker enjoying friendly relations both to Husserl's phenomenological movement and also to the Vienna Circle, was originally published in German in 1930. The work is inspired above all by Husserl, but defends a characteristically Hilbertian thesis to the effect that the true statements of mathematics refer essentially to what is finite and that all reference to the actual infinite in mathematics serves merely abbreviatory purposes. Kaufmann seeks to show that the whole of classical mathematics can be sustained on this finitary basis. Hence he directs particularly detailed analyses to the work of Cantor, on the one hand, and to that of Brouwer, on the other. The present translation includes a long introduction providing valuable additional background, especially in relation to the phenomenological origins of Kaufmann's ideas on logic and mathematics.

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MASSIMO LIBARDI, *Teorie delle parti e dell'intero. Mereologie estensionali.* Trento: Centro Studi per la Filosofia Mitteleuropea, Quaderni 4–6, 302 pp. 22,000 lire.

This monograph is an exhaustive survey of systems of mereology which are 'extensional' both in the sense of being based on extensional systems of logic and in embodying identity conditions to the effect that objects are identical if and only if they have the same proper parts. It covers in more detail and in a more leisurely style the subject matter of the first two chapters of my book *Parts* (1987), the main differences being more diagrams, more historical information, more proofs written out, and a section on R. M. Martin. It does not go beyond the confines of extensional mereology except in a couple of brief forays, and does not enter into philosophical or logical controversy. It is mainly a compendium, which does not claim to break new ground, and does not do so, but it is clearly and simply written. There is a useful bibliography.

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M. S. BURGIN and V. I. KUZNETSOFF, *Aksio-logicheskiye aspekti nauchnikh teorii.* Kiev: Naukova Dymka, 1991. 184 pp. 3 roubles.

The authors, prolific contributors to the philosophy of mathematics and science, here present a methodological model of scientific knowledge, with special emphasis upon its axiological aspects. Their principal device is the theory of 'named sets', which provide means to estimate and value theories; they also deploy fuzzy sets and multisets. Logic as such is not so explicitly exhibited, although they make full use of a theory of relations. Among Western work, this study bears some similarity with the axiomatisation of theories pursued by figures such as J. D. Sneed, who features in their substantial bibliography at the end of the volume.

HANS BURKHARDT and BARRY SMITH (eds.), *Handbook of metaphysics and ontology.* 2 vols. Munich: Philosophia, 1991. 1005 pp. 650 DM.

A large platoon of authors has been assembled to compile this wide-ranging survey of major areas in philosophy and its history. Topics are presented in alphabetical order; particular ones may be retrieved from the excellent index. The article on logic is divided into seven parts (syllogism, post medieval, 19th-century English, Polish, higher-order, free, and ontological implications). In addition, many other articles relate to logic in some ways, and biographies of several logicians are furnished. Each article is completed by its own bibliography for further reading.