

History of Logic from Aristotle to Gödel

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Writings of E. Jennifer Ashworth on the History of Logic. First Part

Earline Jennifer Ashworth (born 1939) studied at Cambridge University and at Bryn Mawr College, where she was awarded a Ph.D. in 1964 (*The Logica Hamburgensis of Joachim Jungius*); she is Distinguished Professor Emerita at the University of Waterloo, Ontario (retired July, 1st 2005) and her main interests are Late Mediaeval and Renaissance logic and philosophy of language; she is Renaissance subject Editor for the *Routledge Encyclopedia of Philosophy*.

The bibliography is composed of four parts:

- First: Books authored and edited by E. Jennifer Ashworth; Articles from 1967 to 1976
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I wish to thank Professor Ashworth for helping me to complete this bibliography.

BOOKS AUTHORED

1. Ashworth, Earline Jennifer. 1974. *Language and Logic in the Post-Medieval Period*. Dordrecht: Reidel. TABLE OF CONTENTS; PREFACE IX; NOTE ABOUT ABBREVIATIONS XIII; ACKNOWLEDGEMENTS XV; CHAPTER I / HISTORICAL INTRODUCTION 1; 1. The Publication of Medieval Works 2; 2. Scholasticism in Italy and Germany 4; 3. Scholasticism in France and Spain 5; 4. Humanism 8; 5. Rudolph Agricola and His Influence 10; 6. Petrus Ramus and His Influence 15; 7. Seventeenth Century Logic: Eclecticism 17; 8. Humanism and Late Scholasticism in Spain 19; 9. Other Schools of Logic 20; 10. A Note on Terminology 22; CHAPTER II / MEANING AND REFERENCE 26; I. The Nature of Logic 26; 1. The Contents of Logical Text-books 26; 2. The Definition of Logic 29; 3. The Object of Logic 32; II. Problems of Language 37; 1. Terms: Their Definition and Their Main Divisions 38; 2. The Relationship between Mental, Spoken and Written Terms 42; 3. Other Divisions of Terms 45; 4. Sense and Reference 47; 5. Propositions and their Parts 49; 6. Sentence-Types and Sentence-Tokens 52; 7. Complex Signifiabiles and Truth 55; 8. Other Approaches to Truth 62; 9. Possibility and Necessity 66; III. SUPPOSITION THEORY 77; 1. Supposition, Acceptance and Verification 78; 2. Proper, Improper, Relative and Absolute Supposition 82; 3. Material Supposition 83; 4. Simple Supposition 84; 5. Natural Personal Supposition 88; 6. Ampliation 89; 7. Appellation 92; IV. SEMANTIC

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"Keckermann remarked of the sixteenth century, "never from the beginning of the world was there a period so keen on logic, or in which more books on logic were produced and studies of logic flourished more abundantly than the period-in which we live." (1) But despite the great profusion of books to which he refers, and despite the dominant position occupied by logic in the educational system of the fifteenth, sixteenth and seventeenth centuries, very little work has been done on the logic of the postmedieval period. The only complete study is that of Risse [a], whose account, while historically exhaustive, pays little attention to the actual logical doctrines discussed. (2) Otherwise, one can turn to Vasoli [b] for a study of humanism, to Muñoz Delgado [c] for scholastic logic in Spain, and to Gilbert [d] and Randall [e] for scientific method, but this still leaves vast areas untouched. In this book I cannot hope to remedy all the deficiencies of previous studies, for to survey the literature alone would take a life-time.

As a result I have limited myself in various ways. In the first place, I concentrate only on those matters which are of particular interest to me, namely theories of meaning and reference, and formal logic. For discussions of such matters as demonstration, the logic of scientific method, the categories, the topics, informal fallacies, humanist logic, Ramist logic, and the whole range of commentaries on Aristotle, the reader will have to look elsewhere. However, in my first chapter, which I must confess to be based largely on secondary sources, I attempt to give an overall picture of the period, so that the reader can assess the place of the people and the theories I discuss in a wider context.

In the second place, although I make extensive references to one or two medieval logicians, particularly Peter of Ailly, whose work was still widely read and discussed in the post-medieval period, I have made no attempt to fill in the medieval background, or to trace the historical antecedents of every doctrine I mention. There are two reasons for this deficiency. One lies in my original purpose, which was simply to describe just what logic a well-read man of the sixteenth or seventeenth century would have been acquainted with. The other, and most important, reason lies in the monumental nature of such a task. An adequate treatment of the historical antecedents would not only double the size of my book, but would quadruple the number of footnotes, as well as taking many years to accomplish. Fortunately medieval logic has been by no means as thoroughly neglected as post-medieval logic, and a very good idea of its scope and achievements can be obtained from the following works, which themselves contain extensive bibliographies:

Nuchelmans, G., *Theories of the Proposition. Ancient and Medieval Conceptions of the Bearers of Truth and Falsity*, Amsterdam, 1973.

Pinborg, J., *Logik und Semantik im Mittelalter. Ein Überblick*, Stuttgart-Bad Cannstatt, 1972.

Rijk, L. M. de, *Logica Modernorum, Vol. I, On the Twelfth Century Theories of Fallacy*, Assen, 1962.

Rijk, L. M. de, *Logica Modernorum, Vol. II, The Origin and Early Development of the Theory of Supposition*, Assen, 1967. This volume is in two parts, the second of which contains texts and indices.

In the third place, I have found myself unable to shed very much light on the historical relations between many of the authors whom I discuss.

So far as those from whom I most frequently quote are concerned, there is little problem. The bulk of my references are to Cebraith, Celaya, Clichtoveus, Enzinas, Pardo, de Soto and Tartaretus, all of whom studied and/or taught at the University of Paris in the first years of the sixteenth century, or earlier in the case of Tartaretus. Needless to say, these men were acquainted with each other's works. Many other references are to Hieronymus of St. Mark of whom I know only that he studied at Oxford and that he

frequently quotes from the work of Pardo; and to the Germans, Trutvetter, Gebwiler and Eckius, who are of the same period and who obviously knew the works of the Parisian logicians as well as the works of Ockham, Buridan, Marsilius of Inghen and Albert of Saxony.

The only later sixteenth century author of whom I make much use is Fonseca, and the only seventeenth century author of whom I make much use is John of St. Thomas. The influences on these men have been comprehensively described in the works of Munoz Delgado, and they stem back to early sixteenth century Paris. However, once one strays outside Spain and the Paris of the early sixteenth century, a number of obstacles to historical understanding immediately appear. Despite Risse's efforts, we still do not know exactly how many logic texts were published, where they were written, or when their first edition appeared. The books themselves usually contain neither biographical nor bibliographical information. Authors not only used each other's work without acknowledgement, but they also criticized each other's work without giving more specific references than "a certain doctor said". Little is known about the curricula of most sixteenth and seventeenth century universities.

Moreover, there is a tremendous amount of sameness about the contents of logical textbooks, particularly in the later period. They can be roughly categorized as Philippist, Ramist, Philippo-Ramist, Aristotelian, or eclectic, but finer distinctions are hard to draw. Even when an author cites his sources, this may be of little help. For instance, we know that Joachim Jungius told Rhenius that he based his logic text upon the works of Dietericus and Johann Kirchmann, (3) but his work bears little obvious relation to that of Dietericus, and I have been unable to see a copy of Kirchmann. In any case, the first edition of Kirchmann listed by Risse appeared in 1638, the very year of the *Logica Hamburgensis*.

On the whole, I think that I will be content to leave the task of unraveling all the relationships between logicians of the later period to the intellectual historian. It is true that a number of medieval doctrines were preserved into the seventeenth century, much later than such authors as Boehner had supposed, and it is true that some new work was done, particularly with respect to the fourth figure of the syllogism, but generally speaking, nothing of interest to the logician was said after 1550 at the very latest. Indeed, now that I have written this book, I have compiled a large list of logic texts from the period 1550-1650 which I shall be happy never to open again. On the other hand, an enormous amount of interesting work remains to be done for the period 1450-1550, and I very much hope that my own research will provide a useful starting point for research by others." (*Preface*, X-XI)

(1) Keckermann, *Praecognitorum Logicorum Tractatus III*, Hanoviae 1606, 109f.

(2) For titles, see the bibliography.

(3) Jungius, *Logica Hamburgensis*, edited and translated into German by R. W. Meyer, Hamburg 1957, editor's introduction, xx.

Notes added:

[a] *Die Logik der Neuzeit. Band I. 1500-1640*, Stuttgart-Bad Cannstatt 1964.

[b] *La dialettica e la retorica dell'umanesimo: 'Invenzione' e 'Metodo' nella cultura del XVI e XVII secolo*, Milano 1968.

[c] *Logica Hispano-Portuguesa hasta 1600*, Salamanca 1972.

[d] *Renaissance Concepts of Method*, New York 1960.

[e] *The School of Padua and the Emergence of Modern Science*, Padua 1961

2. ———. 1978. *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 Mediaeval Studies.

Contents: Preface VII; Part One. Anselm to Paul of Venice (items 1-632) 1; Part Two. After Paul of Venice (items 633-879) 73; Index of Names 101; Index of Texts 105; Index of Translations 107; Index of Subjects 109.

"My main interest in drawing up this bibliography was to list all the books and articles which have to do with formal logic and semantics from the time of Anselm to the end of the seventeenth century. I see this area 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. It is not, of course, always easy to draw a line between works which are concerned with formal logic and semantics and works which are not so concerned, and inevitably my choice of borderline cases will seem too restrictive to some and too liberal to others. However, my hope is that I have not excluded any book or article which obviously falls into the area I have delimited.

I have used the phrase "the tradition of medieval logic" in the title in order to indicate that although I include the seventeenth century, I am not concerned with the contributions of modern philosophy. The work of men such as Pascal, Descartes, Arnauld, Leibniz and Locke carries us far indeed from medieval discussions of logic and semantics. Moreover, there is already such an extensive literature on these figures that to include them in my bibliography would completely change its character. On the other hand, I do include humanist logic and renaissance Aristotelianism, since they involve a reaction to the medieval tradition which can only properly be understood in the light of that tradition.

This is a bibliography of secondary works and of modern editions of early texts. Accordingly I have excluded those nineteenth century reprints of earlier works such as Aldrich's *Artis Logicae Compendium*

which were produced merely as text books, and I have also excluded modern facsimile editions of early printed texts unless they are accompanied by substantial editorial material. In addition, I have omitted a list of the various editions of Milton's *Artis Logicae Plenior Institutio*, since printings of his complete works are both numerous and easily found. The earliest book I list is Victor Cousin's 1836 edition of Abelard, since this can properly be viewed as the starting point of modern scholarly work on medieval logicians.

I do not refer to short edited or translated passages in books of readings. I have included only the more lengthy book reviews, and only a few unpublished dissertations. I have not included biographical and general historical works unless they have some specific contribution to make to the history of logic. I have tried to include all relevant material published before 1977, but the listing of 1976 publications is inevitably incomplete, given the delays which so often occur in the printing of books and journals. I have endeavoured to look at each item personally, and to include as much information as possible. In those cases where I have failed to locate an item, or have located it in a place where I could not conveniently see it, I have made a note of my failure. The reader should bear in mind that these entries may be quite inaccurate. Where I have only been able to see a copy of an article, I have added the note: "Journal not seen."

Works which deal with the period as a whole will be found in Part One.

Where an author has more than one book or article, the items are arranged chronologically.

Below each item I list the headings under which it is indexed and, where relevant, cross-references to reviews, discussions, translations and reprints. The ordering of the headings corresponds to the four indexes I have provided: (1) an index of names; (2) an index of texts; (3) an index of translations; (4) an index of subjects. Only substantial texts and translations are indexed. In the few cases where a book review is not cross-referenced, the reason is that only the review contains material relevant to my purposes. It is my hope that these indexes, which are based on my knowledge of a work's contents rather than its title alone, will prove one of the most valuable aspects of my bibliography.

Readers who wish to find articles dealing with related fields or published after 1976 are recommended to consult two bibliographical sources in particular. They are:

1. *Repertoire Bibliographique de la Philosophie*. Publié par l'Institut supérieur de philosophie de l'Université catholique de Louvain.

2. *The Philosopher's Index*. An International Index to Philosophical Periodicals.

Readers who wish to remedy the omissions I describe in my first three paragraphs are also recommended to consult the following:

Risse, Wilhelm. *Bibliographia Logica*. Band II. 1801-1969. Hildesheim-New York: Georg Olms Verlag, 1973.

Risse's work is far more comprehensive than my own, since he includes not only formal logic, but what might be described as the logic of ideas.

On the other hand, his bibliography is arranged chronologically rather than alphabetically; and inevitably, given the scope of his work, he does not give full publication details and his indexes are minimal. Volume II contains only books, and it is to be hoped that the volume listing journal articles will appear before too long. (*)

I owe a great debt of gratitude to those people who went through an earlier version of this bibliography and provided me with a large number of extra references. In particular I would like to thank William McMahon, Jan Pinborg, Charles Schmitt, and Paul Vincent Spade. I would also like to thank the editorial staff of the Pontifical Institute of Mediaeval Studies for their helpful advice on organization and presentation, the staff of Inter-Library Loan at the University of Waterloo for their unfailing help, and the Canada Council for various grants which have enabled me to work in British libraries. Finally, I should like to thank the Humanities Research Council of Canada for aiding the publication of this book."

(Preface, pp. VII-IX)

(*) [Bibliographia logica. III. *Verzeichnis der Zeitschriftenartikel zur Logik*. Hildesheim-New York: Georg Olms Verlag, 1979].

There is a continuation volume: Fabienne Pironet, *The Tradition of Medieval Logic and Speculative Grammar: A Bibliography (1977-1994)*, Turnhout: Brepols 1997.

3. ———. 1985. *Studies in Post-Medieval Semantics*. London: Variorum Reprints.

Reprint of 12 essays already published.

CONTENTS: Preface IX-X;

REFERENCE IN INTENSIONAL CONTEXTS

I 'For Riding is Required a Horse': A Problem of Meaning and Reference in Late fifteenth and Early sixteenth Century Logic - Vivarium XII. 1974; II I Promise you a Horse': A Second Problem of Meaning and Reference in Late fifteenth and Early sixteenth Century Logic (Parts 1 & 2) - Vivarium XIV. 1976; III Chimeras and Imaginary Objects: A Study in the Post-Medieval Theory of Signification - Vivarium XV. 1977;

PROPOSITIONS AND MENTAL LANGUAGE

IV Theories of the Proposition: Some Early sixteenth Century Discussions - Franciscan Studies 38. 1978

(1981); V The Structure of Mental Language: Some Problems Discussed by Early Sixteenth Century Logicians - *Vivarium* XX. 1982; VI Mental Language and the Unity of Propositions: A Semantic Problem Discussed by Early Sixteenth Century Logicians - *Franciscan Studies* 41. 1981 (1984); SCHOLASTIC INFLUENCES ON JOHN LOCKE
VII "Do Words Signify Ideas or Things?" The Scholastic Sources of Locke's Theory of Language - *Journal of the History of Philosophy* XIX. 1981; VIII Locke on Language - *Canadian Journal of Philosophy* XIV/1. 1984;

LOGICAL ANALYSIS

IX The Doctrine of Exponibilia in the Fifteenth and Sixteenth Centuries - *Vivarium* XI. 1973; X Multiple Quantification and the Use of Special Quantifiers in Early Sixteenth Century Logic - *Notre Dame Journal of Formal Logic* XIX. 1978;

SEMANTIC PARADOXES

XI Thomas Bricot (d. 1516) and the Liar Paradox - *Journal of the History of Philosophy* XV. 1977; XII Will Socrates Cross the Bridge? A Problem in Medieval Logic - *Franciscan Studies* 46. 1976 (1977); *Addenda et Corrigenda*; Index.

"With one exception (IX) the papers in this volume were written after my first book, *Language and Logic in the Post-Medieval Period* (Synthèse Historical Library 12, Dordrecht: Reidel 1974), and they are devoted to a single theme, the philosophy of language in the period from the late fifteenth to the late seventeenth century. The first group of papers (I, II, III) deals with problems of reference in intensional contexts, and the second (IV, V, VI) with problems concerning the nature of propositions and mental language. The last three groups of papers take up more specialized problems. VII and VIII deal with scholastic influences on John Locke's philosophy of language; IX and X discuss two areas of technical logical analysis which had a close bearing on semantic issues; and XI and XII discuss two types of paradox, one of which is clearly semantic, and one of which should perhaps be classified as pragmatic. Many of the issues had been touched on in my book, but here they are presented in much greater depth, on the basis of a closer analysis of the relevant sources. The papers also represent my growing awareness both of the importance of the medieval background to post-medieval philosophy, and of the diversity of intellectual currents which characterized the post-medieval period. For a summing-up of these matters, which will place the logicians discussed here in their proper historical context, I refer the reader to my chapter on logic and language in the *Cambridge History of Renaissance Philosophy*, edited by Charles B. Schmitt (Cambridge: Cambridge University Press, [1988]).

On re-reading the papers collected here, I found that in general I still agree with what I wrote. Nonetheless there are some things that I would now do differently. In particular, I would edit the Latin texts, rather than presenting them in their raw form. I would also try to standardize my use of language. For instance, the verb 'supponere' is variously translated here as 'suppose' and 'supposit'. In this reprint the opportunity has been taken to correct misprints and simple mistakes in the texts themselves; more complicated mistakes are discussed in the *Addenda et Corrigenda*. Where there is, inevitably, an overlap of material I have sometimes used the *Addenda* to indicate where my most up-to-date treatment of the subject is found. I have also brought bibliographical references up to date, and I have added details of recent editions of Latin texts." (from the *Preface*)

4. ———. 2008. *Les Théories De L'analogie Du Xiiè Au Xvie Siècle*. Paris: Vrin. Conférences Pierre Abélard, Université de Paris-IV Sorbonne (2004).
Table des matières: Avant-propos par Irène Rosier-Catach 7; Préface de l'auteur 11; Chapitre premier: Les problèmes: logique, métaphysique, théologie 13; Chapitre II: Thomas d'Aquin: interprétations et malentendus 33; Chapitre III: L'analogie et les concepts: le virage vers l'intérieur 55; Chapitre IV: Autour de l'analogie: ambiguïté et métaphore 79; Bibliographie 105; Index nominum des auteurs avant 1650 119; Index nominum des auteurs modernes 121.
"Afin de donner au lecteur une idée plus précise du plan de mon exposé, je dirai que dans les trois premiers chapitres, j'essaierai d'expliquer le trajet qui mène des Catégories et des Réfutations sophistiques d'Aristote à la tripartition de l'analogie telle que Burley la présente. Dans le premier chapitre, je donnerai un bref historique de la réception des textes et de l'apparition de l'analogie d'attribution au mn e siècle. Je parlerai aussi des antécédents de la notion dans les textes des théologiens de la fin du XII e siècle et du début du XIII e siècle. Dans le chapitre il, je commencerai par un bref aperçu de la pensée de Thomas d'Aquin au sujet de l'analogie en général, avant d'examiner l'analogie de proportionnalité plus en détail. Dans le chapitre in, nous serons de nouveau avec Gauthier Burley et sa doctrine des concepts analogiques. Pour terminer, je consacrerai le dernier chapitre à deux problèmes concernant le langage parlé ou écrit: quand faut-il désambiguïser les propositions en faisant des distinctions, et quel est le rôle de la métaphore dans les discussions des théologiens et logiciens du Moyen Âge?
Prenons comme point de départ la question de savoir pourquoi les auteurs du Moyen Âge ont cru nécessaire de développer une théorie de l'analogie sémantique. Afin de trouver une réponse, nous devons répondre à trois questions préliminaires: 1) Quelles sont les théories métaphysiques et théologiques qui ont produit l'analogie métaphysique? 2) Quelle est la théorie du langage qui prédominait? (3) Quels sont les textes canoniques qui donnaient les instruments que l'on pouvait utiliser pour résoudre le problème

des rapports entre réalité et langage? Dans ce qui suit, j'esquisserai une réponse aux trois questions, avant de parler plus en détail des textes logiques. Ensuite je retournerai aux théologiens afin de parler d'une solution au problème des noms divins qui semble contenir les racines d'une théorie de l'analogie. Pour terminer ce chapitre, j'expliquerai comment l'arrivée des nouvelles traductions d' Aristote et des écrits arabes a mené à la théorie de l'analogie telle qu'on la retrouve chez Thomas d'Aquin. Évidemment je ne serai pas en mesure de donner les réponses avec toute la complexité qui s'impose, surtout à la première question, mais ces quelques remarques, même superficielles, pourront déjà nous indiquer la direction à suivre." (pp. 15-16)

BOOKS EDITED

1. Bricot, Thomas. 1986. *Tractatus Insolubilium*. Nijmegen: Ingenium Publishers. *Artistarium* Vol. 6. Critical edition of the treatise by Thomas Bricot with an introduction, notes, appendices and indices by E. J. Ashworth. Table of Contents: Introduction: 1. Thomas Bricot: Life and Works XIII; 2. The *Tractatus Insolubilium* XIV; 3. About this Edition XV; 4. Description of the Early Printed Editions Used XV; Notes to the Introduction XIX; Bibliography of Secondary Sources XXII; Edition of text: Table of Contents 5; Signs and Abbreviations 11; *Tractatus Insolubilium Magistri Thomae Bricot* 13; Notes to the Text 113; Appendices: Appendix One 123; Appendix Two 129; Appendix Three 138; Indexes: 1. Index of Names 147; 2. Index of Examples 149; 3. Subject Index 153-155.

"1. *Thomas Bricot: Life and Works*

Thomas Bricot was one of the men who laid the foundations for the last flowering of medieval logical doctrines which took place at the University of Paris in the first two decades of the sixteenth century. (1) Little seems to be known about his early life except that he came from Amiens. (2) He took his BA at Paris in 1478, his MA in 1479, and his doctorate of theology in March 1490. During the 1480s he taught philosophy at the Collège de Sainte-Barbe, but when he took his licence of theology in January 1490 he was a *bursarius* of the Collège des Cholets. After 1490 he held a variety of ecclesiastical and academic posts. He spent some time in Amiens; but by 1502 he was back in Paris. Between 1506 and 1516 he often served as dean of the faculty of theology; and he was both canon and penitentiary of Notre Dame. He died in Paris on April 10, 1516. His philosophical work belongs entirely to his early years in Paris.

Much of his activity was directed toward editing the works of others, including a 1487 edition of John Buridan's *Tractatus Summularum*. (3) He produced abbreviated versions of Aristotle's *Organon* and of his natural philosophy; (4) he wrote a series of questions on the *Analytica Posteriora*; (5) but most notably he edited and added questions to the commentaries on Aristotle and on Peter of Spain which had been written by the Paris master, George of Brussels. (6) Bricot's only original works seem to have been the *Tractatus Insolubilium* and the *Tractatus Obligationum* which were always published together and which received at least nine editions between 1489 and 1511. (7) The *Tractatus Obligationum* is largely based on the *De Obligationibus* of Marsilius of Inghen; (8) the *Tractatus Insolubilium* will be discussed below. Bricot's works enjoyed considerable success in Paris in the last two decades of the fifteenth century as one can see from the number of editions printed there, as well as in other French centres. He was also known outside France. His abbreviation of the *Organon* was printed in Basel in 1492 and in Salamanca, ca.1496. It was printed together with a work by George of Brussels in Venice in 1506. (9) Bricot was prescribed to be read at the University of Vienna in 1499; (10) and some of his works were sold by the Oxford bookseller,

John Dorne, in 1520. (11) Indeed, as late as 1535 the University of Cambridge found it necessary to forbid the reading of Bricot. (12) However, I judge that his success was largely due to the usefulness of his texts as teaching manuals rather than to any great originality. The only doctrine of his which I know to have been discussed by other logicians was his solution to the problem of semantic paradoxes found in the *Tractatus Insolubilium*, to which I shall now turn.

2. The '*Tractatus Insolubilium*'

In the *Tractatus Insolubilium* Bricot discusses three approaches to the problem of semantic paradoxes. (13) In the second question he takes up the solution attributed to Ockham, (14) whereby the part of a proposition cannot supposit for the whole. Bricot did not favour this solution. In the third question he discusses two versions of a solution stemming from Peter of Ailly but reworked by George of Brussels. In the first question he presents his own view. This owes much to Roger Swyneshed, but avoids some of the more paradoxical consequences of Swyneshed's view. Bricot allows self-reference to be legitimate; and he treats simple insolubles as being straightforward categorical propositions. However, he revises the conditions under which a proposition is said to be true. An affirmative proposition is true if and only if (I) it signifies that things are as they are and (II) it does not signify itself to be false. On the other hand, a

negative proposition needs to meet only one condition. Either (I) it signifies that things are not as they are not or (II) its contradictory signifies itself to be false. It is here that Bricot differs from Swyneshed, who had treated affirmative and negative propositions alike.

Among the authors who were to discuss Bricot's solution are found Pierre Tartaret; (15) David Cranston; (16) John Mair; (17) and Domingo de Soto. (18) In the version of his *De Insolubilibus* published in 1516, John Mair said explicitly that *opinio magistri nostri thome Briquot ... nunc est communis*. (19)

The *Tractatus Insolubilium* is noteworthy for its treatment of two other issues. First, there is a short discussion of non-semantic paradoxes. (20) Second, there is a very long discussion of the issue of *complexe significabilia* or the significates of propositions, when the latter are viewed as occurrent entities. (21) As with semantic paradoxes, I have discussed Bricot's treatment of these issues at length in other places, and will not dwell on them here.

As an appendix to my edition of the *Tractatus Insolubilium* I have included two short texts in which Bricot takes up the issue of semantic paradoxes once more, and a third text in which he discusses *complexe significabilia*." (pp. XIII-XIV)

2. Pauli, Veneti. 1988. *Logica Magna. Secunda Pars. Tractatus De Obligationibus*. Oxford: Oxford University Press.

Classical and Medieval Logic Texts V. Edited with an English Translation and Notes by E. Jennifer Ashworth.

Contents; Introduction VII-XVI; Part One. 3; Part Two: Concerning *positio*; Chapter One: Against the Rules 101; Chapter Two: On Conjunctions 327; Chapter Three: On Disjunctions 335; Chapter Four: On Similar and Dissimilar 345; Part Three: Concerning *depositio*; Chapter One: Rules 369; Chapter Two: Theses 379; Chapter Three: Sophisms 379; Bibliography: I. Obligations Treatises 393; II. Other Sources 394; Indexes: Index of sophisms 398; Index of names 401; Index of doctrines 404-409.

"The Purpose of Obligations Treatises

A contentious and as yet unresolved issue has to do with the purpose of obligations treatises. The treatises themselves do not offer much discussion on this point, being content to remark that the opponent in a disputation is to try to push the respondent into accepting a contradiction, whereas the respondent has to resist this, even when faced with the curious consequences of granting such a proposition as 'You do not exist.'²³ In the process both participants would have their knowledge of valid inferences thoroughly tested, for each proposition put forward would be such that it followed from preceding steps, or such that its negation followed, or such that neither it nor its negation followed. In this third case either it or its negation would enter the sequence as an extra premiss for further conclusions or non-conclusions. It should also be emphasized that the bulk of almost all treatises on obligations consisted of a series of sophisms which, as Edith Sylla has argued, if the 'physical' sophisms, formed an integral part of logic teaching, at least in fourteenth century Oxford, and were designed to develop a student's subtlety and skill in handling logical rules.²⁴ These remarks suggest that obligational disputations (if such were ever in fact held) had the primary function of providing oral exercise in formal logic, and hence were of mainly pedagogical significance.

This solution has been adopted by a number of authors; but reflection on the complex and sophisticated nature of the controversy between Swyneshed and others has led P.V. Spade to suggest that obligations treatises offer us an account of counterfactual reasoning.²⁵ This theory in turn has been criticized by E. Stump, who points out that the treatises reflect a number of diverse concerns, including 'epistemic logic, indexicals, propositional attitudes, and other issues in the philosophy of language.'²⁶ She also points out that in Burley at least there was 'a concern with special sorts of difficulties in evaluating consequences or inferences as a result of the disputational context in which the inferences occur.'²⁷

My own view is that there is probably something to be said for all these accounts. Insofar as the treatises described a routine to be followed in class-room disputations, the purpose could only have been that of testing a student's skill in formal logic, since truth was explicitly not an issue;²⁸ but the authors and readers of such treatises obviously welcomed the opportunity to discuss other matters in some depth. Paul himself was particularly concerned with the difference between use and mention, as will be seen from many of his sophisms. One must also bear in mind the often-noted link between treatises on obligations and treatises on insolubles. They go together not only in Paul, but in Swyneshed, Albert of Saxony and Strode, to mention but three names. This suggests a general interest in discussing all kinds of paradoxes, both semantic and non-semantic. Whatever the final answer is, reading Paul of Venice should help us to arrive at it, since his *Tractatus de Obligationibus* is a compendium of all the main views current in the second half of the fourteenth century."

²³ For detailed references, see Part 1, section 2, note 3.

²⁴ Uditli Dudley Sylla, 'The Oxford calculators' in CH, 540-563.

²⁵ See Spade, 'Some theories', pp. 1-2, for an account of the literature, and throughout for a defence of his thesis about counterfactual reasoning.

²⁶ See Stump, 'Roger Swyneshed', pp. 169-174: 'The purpose and function of obligations', p. 171 n. 45

is particularly important for her discussion of Spade's thesis.

27 Stump in CH, p. 328.

28 For an account of the distinction between doctrinal disputations, which were designed to arrive at the truth of some claim, and obligational disputations, see E.J. Ashworth, 'Renaissance man as logician: Josse Clichtove (1472-1543) on disputations', *History and Philosophy of Logic*, 7 (1986), 15-29.

3. Sanderson, Robert. 1985. *Logicae Artis Compendium*. Bologna: Editrice CLUEB.

Reprint of the second edition (1618, first anonymous edition 1615), edited with an introduction by E. J. Ashworth.

Contents: Editor's Introduction IX-LV; I. Robert Sanderson: Life and works XI; II. The history of logic in the Sixteenth century XVI; III. Logic in England XXIII; IV. The Oxford curriculum XXXII; V. An analysis of the *Logicae Artis Compendium* XXXV-LV.

Logicae artis compendium. Pars prima 11; Pars secunda 81; Pars tertia 129; Appendix prima 243; Appendix posterior 331; Indices; Index of pre-twentieth century authors and works 371; Index of twentieth-century authors 375; Index of names used in examples 377; Index of Latin terms 379-382.

"V. An Analysis of the *Logicae Artis Compendium*.

In this section I intend to relate Sanderson to his background by focussing on four specific aspects of the *Logicae artis compendium*. I shall discuss (i) the nature of logic; (ii) the medieval heritage; (iii) changes in syllogistic; (iv) method and the art of discourse.

(i) The Nature of Logic

I shall begin by analyzing Sanderson's first chapter, which in a brief compass touches on a range of classificatory issues that were the subject of lively debate during the sixteenth century. The first of these issues concerns the very use of the word 'logica' as opposed to 'dialectica'. It was a medieval commonplace that the word 'dialectica' could be used in two senses, a broad sense which equated dialectic with logic, and a narrow sense, whereby dialectic was that kind of probable argumentation discussed in the *Topics*. (94) Which word was used for the study of all kinds of argumentation was a matter of taste. Peter of Spain had used 'dialectica'; John Buridan and others preferred 'logica'. However, in the sixteenth century greater doctrinal significance became attached to the word 'dialectica'. Ramus argued at some length that Aristotle's 'Organon' did not as was commonly thought discuss three special kinds of logic, i.e. apodictic or demonstrative, dealing with necessary material; dialectic, dealing with probable material; and sophistic, dealing with fallacious material. Instead, there was one general doctrine, which included a general doctrine of invention. (95) Hence, there was no specialized use of the term 'dialectic' and it both could and should properly be applied to logic as a whole. In response Zabarella, for instance, argued that 'dialectic' did name a distinct part of logic, and should be used as the name of that part only. (96) Sanderson allows the wider use; but his remark that 'logica' is 'Synecdochiche Dialectica' is significant, given that synecdoche is the figure of speech whereby a part is put for the whole.

Sanderson next classifies logic as an 'ars instrumentalis'. Once more, his choice of words has to be understood in the light of sixteenth century polemic. There were four ways in which logic could be classified. (97) Peter of Spain had called it both an art and a science; scholastics tended to call it a science; humanists tended to call it an art; and Zabarella called it neither an art nor a science but an instrumental habit. Giulio Pace in turn argued that an instrumental habit was in fact an art; and it seems to be this usage that Sanderson has adopted. Moreover, Sanderson was fully conscious of the implications of his choice, for in Appendix 1, chapter 2, pp. 31-37, he gives a sample speech on the genus of logic. He cites Zabarella (as well as Keckermann) and he concludes that logic is properly speaking an art. In this he is departing from some of his English predecessors, especially Seton, who had classified logic as a science. (100)

The final part of Sanderson's initial characterization of logic is the phrase "dirigens mentem nostram in cognitionem omnium intelligibilium." This definition is very similar to one found in Keckermann, who may well have influenced Sanderson here. Keckermann wrote "[Logica] Est ars humani intellectus operationes sive Hominis cogitationes ordinandi & dirigendi in rerum cognitione." (101) According to the Conimbricenses, the view that logic directed the operations of the mind was found in Fonseca and Suarez, and it is not found explicitly in the *antiquiores*. (102) In order to understand the full significance of Sanderson's definition, it is necessary to relate his remark about directing the mind to his subsequent discussion of the divisions of logic, and it is also necessary to explore his reference to the knowledge of intelligible things in relation to his subsequent classification of the objects and subjects of logic." (pp. XXXV-XXXVIII)

(...)

"Conclusion.

Tolstoi's view of history as an inevitable process, which the actions of Napoleon affect no more and no less than those of the meanest soldier, is an overstatement. Yet it is true that the textbook-writers and schoolteachers of a period may be as important as the leading intellectuals, for it is by these minor figures that all innovations are accepted, altered, and made into the new commonplace. To concentrate solely upon the great thinkers is to obscure the reality of university and school, of the main stream of orthodoxy

which lies behind these thinkers and which feeds them. To judge the true stature of such men as Locke it is helpful to know both what they were taught and how their teaching affected others; but to judge the intellectual quality of the seventeenth century as a whole, such a wider knowledge is essential. Great men stand to some extent outside their period, and it is only the minor thinkers who can provide a safe basis for generalization about that period. This fact alone would be a sufficient basis for the investigation of Sanderson's *Logicae artis compendium*. One cannot claim that it shows new insights into formal logic or the philosophy of language, but it is clearly written and well organized; and, given its success as a logic textbook, it is a valuable historical document. A study of this book will throw much light upon the training and the preoccupations of those who used it; and it will help us to understand not only the development of logic textbooks in seventeenth century England, but also the type of education offered at Oxford and Cambridge." (pp. LIV-LV)

(94) See, e.g., the commentary by John Dorp in *Perutile compendium totius logice Joannes Buridani* (Venice 1499, facsimile edition Frankfurt am Main, 1965), sig.a 2ra. For discussion see Pierre Michaud-Quantin, "L'emploi des termes logica et dialectica au moyen age" in *Arts libéraux et philosophie au moyen age* (Montreal, Institut d'études médiévales, Paris, J. Vrin, 1965), pp. 855-862. See also *Commentarii Collegii Conimbricensis in universam dialecticam Aristotelis* (Cologne, 1607: facsimile edition Hildesheim, New York, 1976) col. 25.

(95) Petrus Ramus, *Scholarum dialecticarum seu animadversionum in Organum Aristotelis*, in *Scholae in tres primas liberales antes* (Francofurti 1581, facsimile edition, Frankfurt am Main 1965), pp. 40-43. He suggested (p. 40) that sophistic was not properly a part of the art of logic, just as 'barbarismorum doctrina' is not properly a part of the art of grammar. Virtue is homogeneous but vices are heterogeneous, he remarked.

(96) Jacobus Zabarella, *De natura logicae* in *Opera Logica* (Cologne 1597, facsimile edition Hildesheim 1966), col. 20. Cf. the discussion by Pedro da Fonseca, *Instituições Dialécticas / Institutionum dialecticarum libri octo*, edited by J. Ferreira Gomes (Universidade de Coimbra, 1964), p. 22. Fonseca remarked that the definition of dialectic as dealing with the probable could not apply to dialectic in the wide sense.

(97) For discussions of these alternatives (and a fifth alternative, that logic is a faculty) see Conimbricensis, cols. 33-37; Zabarella, *De natura logicae*, cols. 5-24.

(98) One favourite phrase of those in the humanist tradition was "ars disserendi". Agricola wrote, for instance, "Erit ergo nobis hoc pacto definita dialectice, ars probabiliter de qualibet re proposita disserendi": Rodolphus Agricola, *De inventione dialectica* (Cologne 1523, facsimile edition Frankfurt am Main, 1967), p. 193. For discussion and further references see Ong, *Ramus, Method and the Decay of Dialogue*, pp. 178-179; and Conimbricensis, cols. 25-27.

(99) Julius Pacius, *In Porphyrii Isagogen et Aristotelis Organum Commentarius Analyticus* (Frankfurt 1597, facsimile edition, Hildesheim 1966), p. 2a: "Ergo logica est habitus instrumentalis, id est ars."

(100) Seton (sig. A 59 wrote: "Dialectica est scientia, probabiliter de quovis themate disserendi." Cf. John Sanderson, *Institutionum dialecticarum* (Oxoniae 1602) p. 3 and Samuel Smith, *Aditus ad logicam* (Oxonii, 1684, editio nona) p. I, for similar definitions.

(101) Bartholomaeus Keckermann, *Praecognitorum logicorum tractatus tres* in *Operum omnium quae extant tomus Primus* (Genevae, 1614), col. 90-91.

(102) Conimbricensis, col. 42.

ARTICLES 1967-1976

1. Ashworth, Earline Jennifer. 1967. "Joachim Jungius (1587-1657) and the Logic of Relations." *Archiv für Geschichte der Philosophie* no. 49:72-85.
 "In histories of logic, the sixteenth and seventeenth centuries, at least until Leibniz began his work, are either ignored or are referred to with the utmost brevity as being hardly worthy of attention (1).
 (...) However, there is one name which appears with fair regularity in the literature, and that is the name of Joachim Jungius, whose *Logica Hamburgensis* is often contrasted favorably with the Port Royal Logic. Both Bochenski and the Kneales allow this book, published in 1638 for the use of the Classical Schools at Hamburg, to be one of the better textbooks of the period (2); while Heinrich Scholz in his influential *Geschichte der Logik*, not only praises it highly, but discusses Jungius's contributions to logic at some length (3). More impressive yet are the varied tributes paid to Jungius by Leibniz, who called him "one of the most able men that Germany has ever had" (4); compared him with Galileo and Descartes (5); and said that "he surpassed all others in the knowledge of true logic, not even excepting the author of the *Artis Cogitandi* [Arnauld]" (6). Of course, much of Leibniz's praise arose from his admiration of Jungius's

varied activities, his career as a medical doctor, his contributions to physics, botany, mineralogy, theology, educational theory, and his foundation of the first-learned society in Germany (7). More specifically, however, Leibniz admired Jungius for his demonstration that not all inferences could be reduced to syllogistic form, and he praised his logical acuteness in this respect on a number of occasions (8). The purpose of this paper is to shed some light on a much neglected area of the history of logic by inquiring whether Jungius's treatment of non-syllogistic or, in this context, relational inferences, is commensurate with the logical distinction which has been claimed for him; and, more briefly, to see whether there are any further factors which set Jungius above other logicians of the same period." (pp. 72-73)

(...)

"In conclusion one may say that although the *Logica Hamburgensis* shares in all the faults of its age, the superficiality, the lack of metalogical perceptiveness, it also has merits which are peculiarly its own. The body of truth-functional logic contained in it would alone be sufficient to distinguish Jungius from his contemporaries, and still more impressive, given the background, is his use of relational inferences. It is true that the argument *a divisio ad composita* is both unoriginal and unremarkable, despite Scholz's praise; it is true that the inversion of relations is found in other contemporary logicians; while discussion of the oblique syllogism was quite usual; but the argument *a rectis ad obliqua* was both original and clearly presented. Moreover, Jungius seems to have been fully conscious that relational inferences were inferences in their own right, to be treated as such and not to be hidden away among the categories. Without this realization, any amount of originality in the discovery of actual inferences could have gone for nought. Hence, while the verdict of Heinrich Scholz needs modification, his praise of Jungius is basically justified, for it was he who brought the logic of relations to the attention of his successors, especially Leibniz." (p. 85)

(1) In this context, it must be acknowledged that historians of thought have been kinder than those devoted strictly to formal logic. For instance, Peter Petersen's seminal work, *Geschichte der aristotelischen Philosophie im protestantischen Deutschland*, Leipzig 1921. contains much material of interest to the historian of logic. The publication in 1964 of Dr. Wilhelm Risse's work, *Die Logik der Neuzeit. 1. Band. 1500—1640*, Stuttgart-Bad Cannstatt 1964, marks a great step forward in the study of the field.

(2) I. Bochenski, *History of Formal Logic*, translated and edited by Ivo Thomas, Notre Dame, Indiana, 1961, p. 257, W. & M. Kneale, *The Development of Logic*, Oxford 1962, p. 313.

(3) H. Scholz, *Geschichte der Logik*, Berlin 1931, pp. 41—2.

(4) "Letter to Christian Habbeus, Jan. 1676", *Samtliche Schriften und Briefe*, edited by the Prussian Academy of Sciences (1923) 1st Series, Vol. I, p. 443.

(5) *Opuscules et fragments inédits de Leibniz*, edited by L. Couturat, Paris 1903, p. 345.

(6) "Letter to Koch, 1708", quoted by Couturat in *La logique de Leibniz*, Paris 1901, note 4, p. 74.

(7) *The Societas Ereunetica*, founded in Rostock in 1622. Unhappily, it lasted at most only two years. For further information on Jungius's life, see the following works:

G. Guhrauer, *Joachim Jungius und sein Zeitalter*, Stuttgart und Tübingen 1850; *Beiträge zur Jungius-Forschung. Prolegomena zu der von der Hamburgischen Universität beschlossenen Ausgabe der Werke von Joachim Jungius (1587—1657)*, edited by A. Meyer, Hamburg 1929; Joachim Jungius-Gesellschaft der Wissenschaften: *Die Entfaltung der Wissenschaft. Zum Gedenken an Joachim Jungius*, Hamburg 1957. The second work mentioned contains an extensive bibliography.

(8) *Opuscules et fragments inédits*, p. 287, p. 330, p. 406.

2. ———. 1968. "Propositional Logic in the Sixteenth and Early Seventeenth Centuries." *Notre Dame Journal of Formal Logic* no. 9:179-192.

"Until recently, historians of logic have regarded the early modern period with unremitting gloom. Father Boehner, for instance, claimed that at the end of the fifteenth century logic entered upon a period of unchecked regression, during which it became an insignificant preparatory study, diluted with extra-logical elements, and the insights of men like Burleigh into the crucial importance of propositional logic as a foundation for logic as a whole were lost.(1) Nor is this attitude entirely unwarranted, for the new humanism in all its aspects was hostile to such medieval developments as the logic of terms and the logic of consequences. Those who were devoted to a classical style condemned medieval works as unpolished and arid, and tended to subordinate logic to rhetoric; while those who advocated a return to the original works of Aristotle, freed from medieval accretions, naturally discounted any additions to the subject matter of the *Organon*.

But it would be a mistake to dismiss the logical work of the period too readily. In the first place, the writings of the medieval logicians were frequently published and widely read. To cite only a few cases, the *Summulae Logicales* of Petrus Hispanus received no fewer than 166 printed editions;(2) Ockham's *Summa Totius Logicae* was well known; the 1639 edition of Duns Scotus included both the *Grammaticae Speculativae* attributed to Thomas Erfurt and the very interesting *In Universam Logicam Quaestiones of Pseudo-Scotus*; (3) the *Logica* of Paulus Venetus was very popular; and a number of tracts by lesser known men like Magister Martinus and Paulus Pergulensis were printed. Moreover, since logic still

played such a preeminent role in education, contemporary scholars were not backward in producing their own textbooks; and numerous rival schools of logic flourished.(4) The purpose of this paper is to make a preliminary survey of some of the wealth of material available from the sixteenth and first half of the seventeenth centuries, in order to ascertain how much of the medieval propositional logic had in fact been retained.(5) It will become clear that the situation was better than has been thought." (p. 179)

(1) See P. Boehner, "Bemerkungen zur Geschichte der De Morgansche Gesetze in der Scholastik," *Archiv für Philosophie*, 4 (1951), p. 145.

(2) See J. P. Mullally, *The Summulae Logicales of Peter of Spain* (Notre Dame, Indiana, 1945), p. LXXVIII.

(3) In Joannes Duns Scotus, *Opera Omnia*, edited by L. Wadding (Lugduni, 1639), Vol. I.

(4) For a comprehensive account of the various schools of logic, see Dr. Wilhelm Risse, *Die Logik der Neuzeit. I. Band 1500-1640*, (Stuttgart-Bad Cannstatt, 1964).

(5) I have limited myself to material in the British Museum and the Cambridge University Library for the purposes of this introductory survey.

3. ———. 1968. "Petrus Fonseca and Material Implication." *Notre Dame Journal of Formal Logic* no. 9:227-228.

"Little attention has been paid to the question of whether material implication was recognized in the sixteenth and seventeenth centuries, although it has been argued that John of St. Thomas was aware of the equivalence ' $(p \supset q) \equiv (\sim p \vee q)$ '.(1) The other usual test-case for a knowledge of material implication is ' $(p \supset q) \equiv \sim(p \cdot \sim q)$ ' and I intend to show that the sixteenth century Jesuit, Petrus Fonseca, whose *Institutionum Dialecticarum libri octo* was one of the most popular textbooks of the period, (2) was well acquainted with this second equivalence." (p. 227)

(...)

"One must conclude that Fonseca was aware both of strict and of material implication." (p. 228)

(1) See Ivo Thomas, "Material Implication in John of St. Thomas", *Dominican Studies* 3 (1950), p. 180; and John J. Doyle, "John of St. Thomas and Mathematical Logic", *The New Scholasticism* 27 (1953), pp. 3-38.

(2) First published in 1564, it went into at least 44 editions. See Wilhelm Risse, *Die Logik der Neuzeit*, Band I. 1500-1640 (Stuttgart-Bad Cannstatt, 1964), p. 362, n. 395.

4. ———. 1969. "The Doctrine of Supposition in the Sixteenth and Seventeenth Centuries." *Archiv für Geschichte der Philosophie* no. 51:260-285.

"The purpose of this paper is to make a preliminary survey of some of the wealth of material available from the sixteenth and first half of the seventeenth centuries, in order to ascertain how much of the medieval propositional logic had in fact been retained.(5) It will become clear that the situation was better than has been thought.

The vocabulary and organization of the textbooks under consideration were fairly standard. The discussion of the proposition [*Enuntiatio*, *Propositio*, or, in Ramist texts, *Axioma*] followed sections on the predicaments and predicables or the Ramist equivalent, on arguments. Medieval logicians had called the compound proposition 'hypothetical', but sixteenth and seventeenth century writers more usually referred to *enuntiatio coniuncta* or *composita*, sometimes with a note to the effect that it is vulgarly or improperly called 'hypothetical'.(6) Melancthon retained the name 'hypothetical', as did one or two others.(7) The Spanish scholastic, Petrus Fonseca, discussed the whole question in some detail, saying that the name 'hypothetical' most properly applies to conditional propositions, but can also be used of disjunctions, because they imply a conditional.(8) A compound proposition was generally said to consist of two (or more) categorical propositions, joined by one (or more) of a list of propositional connectives. The assumption that the truth of these propositions depended upon the truth of the parts, the kind of connective employed, and in certain cases the relationship between the parts usually remained implicit, but the seventeenth century German logician, Joachim Jungius, said explicitly that truth or falsity depended on "the kind of composition involved";(9) while Alsted had written previously that truth or falsity depended "on the disposition of parts". (10)

There was much agreement as to the kinds of compound proposition to be considered. Conditional, conjunctive, and disjunctive propositions were always mentioned. Those logicians in the scholastic tradition, like Campanella, Cardillus, Fonseca, Hunnaeus and John of St. Thomas, included causal and rational propositions, as did some outside the tradition like Cornelius Martini and Jungius, who discussed the causal proposition at length. Only a few, including Fonseca and C. Martini, mentioned the temporal and local propositions which had been discussed by such medieval logicians as Ockham and Burleigh; but both Ramus and Burgersdijk spoke of 'related' propositions which exhibit 'when' and 'where' among other connectives.(11)

Ramus and those influenced by him added a new kind of compound proposition, the discrete.

Although compound propositions were rarely called 'hypothetical', the traditional title of 'hypothetical syllogism' was usually retained for the discussion of propositional inference forms. Only a few spoke of *sylogismus compositus* or *coniunctus*. (12) In all cases the categorical syllogism was discussed before the

hypothetical, and usually such matters as sorites, example, enthymeme and induction also came first. A few books had, in addition, a section on the rules for valid inference or *bona consequentia*. Melancthon in his *Erotemata Dialectices* included a chapter entitled *De Regulis Consequentiarum* after his discussion of sorites and before his discussion of the hypothetical syllogism. Alsted placed his canons of material consequence in the same position; while the remarks of Caesarius come after his section on the hypothetical syllogism. On the other hand, the three scholastics, Campanella, Fonseca, and Hunnaeus introduced their rules for good consequence before they discussed the syllogism, thus approaching most closely to the later medieval order of priorities." (pp. 179-180)

(...)

"It is indeed true that the logicians of the sixteenth and early seventeenth centuries failed to appreciate the fundamental importance which the logicians of the later middle ages had attributed to propositional logic; and a number of the texts I have been concerned with even give instructions for the reduction of hypothetical syllogisms to categorical syllogisms.(88) On the other hand, the amount of propositional logic retained was by no means negligible, and some authors, such as Fonseca and Jungius, included a great deal. No startling advances were made, but there were innovations in detail, like Jungius's discussion of the posterior subdisjunctiva, or the linking of the conditional with a negated conjunction. One may therefore conclude that, while the period is not one of great excitement for the historian of logic, it merits considerably more attention than it has been granted in the past." (p. 188)

(5) I have limited myself to material in the British Museum and the Cambridge University Library for the purposes of this introductory survey.

(6) Cf. Thomas Campanella, *Philosophiae Rationalis Partes quinque. 2. Dialectica* (Parisiis, 1638), p. 334; Augustinus Hunnaeus, *Dialectica seu generalia logices praecepta omnia* (Antverpiae, 1585), p. 147; and Amandus Polanus, *Logicae libri duo* (Basileae, 1599), p. 147.

(7) Philippus Melancthon, *Erotemata Dialectices*, (---, 1540?), p. 96. Cf. Johannes Caesarius, *Dialectica* (Coloniae, 1559), Tract. IV [No pagination]; and Cornelius Martini, *Commentationum logicorum adversus Ramistas* (Helmstadii, 1623), p. 204.

(8) Petrus Fonseca, *Institutionum Dialecticarum libri octo* (Conimbricae, 1590), Vol. I, p. 173. Cf. Abelard's discussion of the same point in his *Dialectica*, edited by de Rijk (Assen, 1956), p. 488.

(9) Joachim Jungius, *Logica Hamburgensis*, edited by R. W. Meyer (Hamburg, 1957), p. 98. '[Enuntiatio conjuncta] . . . secundum illam compositionis speciem, veritatis et falsitatis est particeps".

(10) J. H. Alsted, *Logicae Systema Harmonium* (Herbonae Nassoviorum, 1614), p. 321. "Compositi axiomatis veritas & necessitas pendet specialiter ex partium dispositione".

(11) Petrus Ramus, *Dialecticae libri duo* (Parisiis, 1560), p. 126; and Franco Burgersdijck, *Institutionum Logicarum libri duo*, (Lugduni Batavorum, 1634), pp. 166-167.

(12) E.g., Fonseca, op. cit., vol. II, p. 100, refers to "syllogismus coniunctus"; and Polanus, op. cit., p. 165, refers to "syllogismus compositus".

(88) E.g., Conrad Dietericus, *Institutiones Dialecticae* (Giessae Hassorum, 1655), p. 312; Fortunatus Crellius, *Isagoge Logica* (Neustadii, 1590), pp. 243-246; and Jungius, op. cit., *passim*.

5. ———. 1970. "Some Notes on Syllogistic in the Sixteenth and Seventeenth Centuries." *Notre Dame Journal of Formal Logic* no. 11:17-33.

"Although a number of different schools of logic flourished in the sixteenth and seventeenth centuries (2), they seem to have shared a lack of interest in formal logic which expressed itself in a greater concern for the soundness than for the validity of arguments. An example of this tendency is the emphasis placed upon the Topics, or the ways of dealing with and classifying precisely those arguments which were not thought to be susceptible of formal treatment, since they depended for their effectiveness upon the meaning of the terms involved.(3) It is true, of course, that the Humanists and, later, the Ramists, devoted considerably more space to the Topics and to the "invention" of arguments than did the scholastics, the Aristotelians, the Philippists or followers of Melancthon, or even the eclectics; but this was balanced by the greater devotion of the other schools to the categories, the predicables, the pre-, post-, and even extra-predicaments.(4) However, there was one subject which was both formal in inspiration and common to all text-books, namely, the syllogism; and as a result it provides a very good test of how much interest and competence in purely formal matters was retained during these centuries of logical decline." (p. 17)

(...)

"In the light of this discussion, I find myself driven to the reluctant conclusion that genuine competence in formal logic was not often to be found in this period, at least where syllogistic was concerned. One distressing feature is the lack of discussion of issues like the definition of the major and minor terms or the status of singular propositions. Frequently one is left to guess differences in meta-theory from differences in usage.

And even where there is discussion, it is not always adequate. For instance, a doctrine of the relationship between terms was used to exclude the fourth figure without any realization that this doctrine could not properly be applied to the first, second or third figures. Another characteristic of logicians of this period was a random introduction of new modes. What reason could be given for listing only two indirect modes of the second figure, or for allowing singular terms to appear only in third figure syllogisms? Finally,

many logicians introduced frankly extra-logical considerations into their discussions. What was natural, what was fitting, what people tended to say, were all thought to be relevant issues. Only Arnauld and Alsted and, to a lesser extent, Campanella, present the right doctrines for the right reasons, unencumbered by extraneous material." (pp. 27-28)

(1) This study is based on an examination of printed texts in the British Museum, the Cambridge University Library, and the Bodleian. I do not mention Leibniz because he was not a writer of logical textbooks.

(2) For a comprehensive account of the various schools, see Wilhelm Risse, *Die Logik der Neuzeit. I Band. 1500-1640* (Stuttgart-Bad Cannstatt, 1964).

(3) The situation is rather different today. For instance, much of the material discussed under the Topic of *genus* and *species* could be dealt with by set theory, and much of that discussed under the Topic of part and whole could be formalized by the methods of S. Lesniewski. The *Topics*, as treated by Boethius, Abelard, and Peter of Spain, are discussed by Otto Bird, in his article "The Formalizing of the Topics in Mediaeval Logic," *Notre Dame Journal of Formal Logic*, vol. 1 (1960), pp. 138-149.

(4) For a typical account of these matters see Joachim Jungius, *Logica Hamburgensis*, edited by R. W. Meyer (Hamburg, 1957), Book I.

6. ———. 1972. "The Treatment of Semantic Paradoxes from 1400 to 1700." *Notre Dame Journal of Formal Logic* no. 13:34-52.

"During the middle ages, semantic paradoxes, particularly in the form of "Socrates speaks falsely", where this is taken to be his sole utterance, were discussed extensively under the heading of *insolubilia*. Some attention has been paid to the solutions offered by Ockham, Buridan, and Paul of Venice, but otherwise little work seems to have been done in this area.

My own particular interest is with the generally neglected period of logic between the death of Paul of Venice in 1429 and the end of the seventeenth century; and the purpose of this paper is to last some light both upon the new writings on paradoxes and upon the marked change in emphasis which took place during the sixteenth century. Although the traditional writings on *insolubilia* were available throughout the period, the detailed discussions of the fifteenth and early sixteenth centuries were soon entirely replaced by briefer comments whose inspiration seems wholly classical. Even the mediaeval word *insolubile* was replaced by the Ciceronian *inexplicabile*. In this area at least there is strong evidence for the usual claim that the insights of scholastic logic were swamped by the new interests and studies of Renaissance humanism." (p. 34)

(...)

"Whether any of these solutions is likely to bear fruit today is for the reader to decide. It is, however, clear that the writers of the fifteenth and early sixteenth century were inspired by a genuine interest in problems of logic and language, and that they handled them with the finest tools available. That their discussions should have been so completely ignored by subsequent logicians, some of whom were doubtless their pupils, is surprising, given both the availability of their books and the persistence of other traditional doctrines like supposition. (81)" (p. 45)

(81) See my article, "The Doctrine of Supposition in the Sixteenth and Seventeenth Centuries", *Archiv für Geschichte der Philosophie* vol. 51 (1969), pp. 260-285.

7. ———. 1972. "Strict and Material Implication in the Early Sixteenth Century." *Notre Dame Journal of Formal Logic* no. 13:556-560.

"One of the favorite games played by historians of logic is that of searching their sources for signs of the Lewis-Langford distinction between strict and material implication. There are three ways of going about this, but the first two are often reminiscent of the conjurer searching for his rabbit, and only the third has real merit, for it alone involves the study of what was said about the conditional as such. I shall look at each way in turn, in relation to writers of the early sixteenth century." (p. 556)

(...)

"I think it is fair to conclude by saying that some early sixteenth century logicians were beyond doubt aware of the distinction between strict and material implication; and that no special pleading is necessary to establish this." (p. 560)

8. ———. 1972. "Descartes' Theory of Clear and Distinct Ideas." In *Cartesian Studies*, edited by Butler, Ronald Joseph, 89-105. Oxford: Basil Blackwell.

"It is widely agreed that Descartes took ideas to be the objects of knowledge and that his theory of clear and distinct ideas arose from his attempt to find a way of picking out those ideas whose truth was so certain and self-evident that the thinker could be said to know them with certainty. To say of an idea that it is clear and distinct was, he believed, to say of it both that it was certainly true and that any claim to know it was justified. No other criterion need be appealed to. It is at this point, however, that most of those who set out to expound Descartes' theory of knowledge are brought to a standstill. The part played by clear ideas is obvious enough, but what did Descartes mean by 'clear and distinct'? This paper is an attempt, not to make an original contribution to the study of Descartes, but to elucidate his terms and evaluate his criterion in the light of what both he and others have written." (p. 89)

(...)

"The fact that Descartes adopted the word 'idea' is itself significant. When scholastic philosophers discussed human cognition, they spoke of the mind as containing concepts (*species, intentiones*). They claimed that these concepts originated through our sense perceptions, and hence that they stood in some relation to external objects. The term 'concept' was contrasted with the term 'idea'. Ideas were the eternal essences or archetypes contemplated by God, and the question of their external reference did not arise. They were an integral part of God's mind. God could create instances of one of his ideas, but his idea was in no way dependent upon the existence of such instances. Descartes took the word 'idea' and applied it to the contents of the human mind because he wanted to escape the suggestion that these contents must be in some sense dependent on the external world as a causal agent. (9) He wished to establish the logical possibility that a mind and the ideas contained within it are unrelated to other existents, and can be discussed in isolation from them.

Descartes saw the term 'idea' as having a very wide extension.

He said "... I take the term idea to stand for whatever the mind directly perceives,"(10) where the verb 'perceive' refers to any possible cognitive activity, including sensing, imagining and conceiving.(11) Thus a sense datum, a memory, an image, and a concept can all be called ideas. This, of course, leads to the blurring of distinctions. For Descartes, "I have an idea of red" may mean that I am now sensing something red, or that I have a concept of the colour red, even if I am not now picking out an instance of that concept. Moreover, when Descartes speaks of an idea, he may be taking it as representative of some object or quality in the physical world, as when he says "I have an idea of the sky and stars," or he may be referring to the meaning he assigns to a word, as when he says "I have an idea of substance." Nor does he make any distinction between "having an idea" and "entertaining a proposition." Such statements as "Nothing comes from nothing" and "The three angles of a triangle are equal to two right angles" are categorized as 'common notions',(12) and are included among the contents of the mind. Descartes does remark that in some cases an idea may be expressed by a name, in other cases by a proposition,(13) but he does not bother to pursue this line of inquiry.

One of the characteristics of an idea is 'objective reality', a scholastic phrase which Descartes adopted, but used in a new way. In scholastic writings the terms 'subjective' and 'objective' have meanings which are the reverse of the modern meanings. An object like a table exists subjectively or as a subject if it has spatio-temporal existence, if it is real or actual. In contrast, the concept of a table can be looked at as having two kinds of existence. The concept *qua* concept has formal existence, but the concept as having some specifiable content is said to have objective existence, or existence as an object of thought. The concepts of a table and of a chair are formally similar but objectively different. So far as subjective realities were concerned, the scholastics assigned them different grades of reality according to their perfection and causal power. For instance, a substance is more perfect and causally more efficacious than an accident, hence a man has a higher grade of reality than the colour red.

It was also held that every effect had a cause with either an equal or a higher grade of reality. These doctrines were not seen as having any relevance to concepts. As formally existent, a concept has of course to have some cause, but the content of the concept was not seen as having any independent reality. Descartes, however, felt that the objective reality could be considered independently of its formal reality, and that it must be graded just as subjective reality was graded. The idea of a man, he felt, has more objective reality than the idea of a colour. Moreover, the cause of the idea containing a certain degree of objective reality must have an equal or greater degree of subjective reality. For instance, the idea of God has so high a degree of objective reality that only God himself is perfect enough to be the cause of such an idea.(14)" (pp. 91-93)

(...)

"Although Descartes struggled to defend his criterion, his struggles ended in an impasse. He had made the mistake of trying to prove too much. He had wanted to develop an introspective technique by which he could be sure of recognizing those ideas which were objects of certain knowledge; but such an enterprise was doomed from the start. He could only escape from the objection that nothing about an idea can justify us in making judgment about its external reference by entering into an uneasy and unjustifiable alliance with God; and by such an alliance he negated his claim that a single criterion for true and knowable ideas could be found." (p. 105)

(9) E. S. Haldane, G. R. T. Ross (eds.), *The Philosophical Works of Descartes*, (Cambridge, 1911) [cited as 'HR'] vol. II, 68.

(10) HR II, 67-8.

(11) HR I, 232.

(12) HR I, 239.

(13) C. Adam P. Tannery, *Oeuvres de Descartes* (Paris 1897-1913) [cited as 'AT'] AT III, 395.

(14) HR I, 161-170.

9. ———. 1973. "Are There Really Two Logics?" *Dialogue. Canadian Philosophical Review* no. 12:100-109.

"As a historian of logic, I am frequently puzzled by the things which people have to say about the

relationship between mathematical logic and some other kind of logic which is variously described as 'intentional' and 'traditional.' Part of my puzzlement arises from my failure to understand precisely what kind of system is being offered under the guise of intentional logic. I have always taken it that logic is concerned with valid inferences, with showing us how we may legitimately derive a conclusion from a set of premisses; yet the validation of inferences seems to be the least of the concerns of the intentional logician. He says that it can be done, but he does not bother to show us how. My purpose in this paper is to list some of the sources of my puzzlement in the hope that an exponent of intentional logic will show me how they can be resolved, and how their resolution will contribute to the building of a system (however informal) in which different types of argument can be validated."

10. ———. 1973. "Existential Assumptions in Late Medieval Logic." *American Philosophical Quarterly* no. 10:141-147.

"There are three types of existential assumption that are commonly made by logicians: (1) that subject terms refer to non-empty classes; (2) that proper names have referents; and (3) that formulas are to be interpreted only within non-empty domains. In the standard first-order quantificational calculus with constants, the second and third of these assumptions are retained, but the first, which is attributed to traditional syllogistic, has been abandoned.

Subject terms may refer to empty classes, and a distinction can be drawn within the system between those inferences which are valid only for non-empty classes and those which are valid for both empty and non-empty alike. For instance, given the assumption that universally quantified propositions whose subject terms refer to empty classes are true, but that existentially quantified propositions whose subject terms refer to empty classes are false, it turns out that the inference from "All *As* are *B*" to "Some *As* are *B*" only holds with the addition of the premiss, "There is at least one *A*." More recently, systems have been constructed in which the other two assumptions have also been discarded. Their valid formulas are valid in both empty and non-empty domains, and non-denoting constants are admitted. Any inference whose validity depends on the assumption that the domain of interpretation is non-empty, or that a constant denotes, is distinguished from the others by the presence of an extra premiss.(1) Thus, what was an assumption implicitly applied to all cases, is now made explicit and is shown to apply only to a subset of formulas within the system.

It is frequently assumed that medieval logic operated with a group of implicit existential assumptions similar to those I have mentioned, but this view is erroneous. Late medieval logicians were just as concerned as contemporary logicians to deal with non-denoting terms within their systems, and to draw explicit distinctions between those inferences whose validity involves existential assumptions and those whose validity does not involve existential assumptions. It is inappropriate to ask whether they took their formulas to be valid within the empty domain or not, both because they worked with ordinary language rather than with formal systems, and because they did not use the notion of interpretation within a domain. When they interpreted a sentence such as "All men are animals," they did not speak of a domain of individuals some of whom were men and some of whom were animals, but only of those individuals who were either men or animals.

However, they explicitly concerned themselves with the other two existential assumptions, and they admitted both non-denoting constants and terms referring to empty classes to their system. In this paper I intend to examine how some logicians of the late 15th and early 16th centuries interpreted sentences containing non-denoting terms, how they assigned truth values to them, and how they dealt with those inferences which needed an existential premiss to ensure validity." (p. 141)

(...)

"My discussion has been necessarily somewhat sketchy, and I have not examined all the contexts in which *constantia* was used,(28) but it should have become clear by now not only that late medieval logicians had clear views about the existential import of various types of sentences, but that they used their initial decisions about the truth and falsity of sentences containing non-denoting terms to build a consistent system. It is to be regretted that the vast majority of logicians after the third decade of the 16th century ceased to discuss these matters, with the result that modern readers tend to think of traditional logic as lacking a sophistication which it did indeed possess." (p. 147)

(1) See, for example, W. V. O. Quine, "Quantification and the Empty Domain" in *Selected Logic Papers* (New York, 1966), pp. 220-223; Hugues Leblanc and Theodore Hailperin, "Non-Designating Singular Terms," *The Philosophical Review*, vol. 68 (1959), pp. 239-243; B. C. van Fraassen, "Singular Terms, Truth Value Gaps and Free Logic," *The Journal of Philosophy*, vol. 63 (1966), p. 481-495. There is a large and growing body of literature on the topic of logics which are free from existential suppositions. (29)

11. ———. 1973. "Andreas Kesler and the Later Theory of Consequence." *Notre Dame Journal of Formal Logic* no. 14:205-214.

"In another paper I examined the theory of consequence presented by a number of later fifteenth and early sixteenth century writers, ending with Javellus, an Italian who died in 1538. (1) For this earlier period, there was an abundance of material, containing much sophisticated discussion of semantical issues; but the next hundred years do not offer more than a few sources, and these are of limited value. The only

really outstanding figure, so far as I can see, is that of Andreas Kesler. He was a Protestant theologian who was born at Coburg in 1595, educated at Jena and Wittenberg, and died in 1643 after a long career in education. In 1623 he published a book entitled *De Consequentia Tractatus Logicae* which is unique, both for its own time, and as compared to the products of this earlier period, in that it explicitly subsumes the whole of formal logic under the theory of consequence. The laws of opposition and conversion, the categorical and hypothetical syllogism, were all seen as different types of consequence. Moreover, no extraneous material was included. Instead of starting with the categories, like the Aristotelians, or with the invention of arguments, like the Ramists, he devoted his first chapter to the definition of consequence. Topics, informal fallacies and other such subjects found no place, whereas some rarely discussed matters like exclusive and reduplicative propositions and the modal syllogism did appear. Thus he stands out for his contents as well as for his organization." (p. 205)

(...)

"After this brief survey one can only conclude that the theory of consequence suffered an abrupt decline after the first part of the sixteenth century. The one outstanding writer on the subject was Andreas Kesler, but he stands out for a single insight, rather than for any awareness of the ramifications of the theory. Unlike his sources, he saw that all of formal logic could be subsumed under the basic notion of consequence, and he was able to exclude extraneous material, but that was as far as he went. About the definition and division of consequence, and about consequential rules, he had nothing to say but what had been said before him by Fonseca and Regius. Nor did he betray any knowledge of earlier writers, although some at least must have been available to him in Wittenberg. For once those who deplore the loss of mediaeval insights during the sixteenth century seem to be justified." (p. 210)

(1) See my paper "The Theory of Consequence in the Late Fifteenth and Early Sixteenth Centuries," to appear in *Notre Dame Journal of Formal Logic*, vol. XIV (1973), No. 3, pp. 289-315.

12. ———. 1973. "The Theory of Consequences in the Late Fifteenth and Early Sixteenth Centuries." *Notre Dame Journal of Formal Logic* no. 14:289-315.

"In this paper I intend to examine the treatment accorded to consequences by a group of writers from the late fifteenth and early sixteenth centuries, although I shall make some reference to earlier periods. The subject of consequences (or valid inference) is of central importance to the historian of logic because those who discussed it covered such a wide range of logical issues, including criteria for validity, problems of self-reference, the status of the so-called paradoxes of strict implication, and the systematization of valid inference forms. Indeed, a large part of semantics and the whole of formal logic could be subsumed under this general heading. Whether the authors themselves fully appreciated that this was so is unfortunately not such an easy question to answer, for those I am concerned with frequently leave the reader in doubt as to their view of the relation of consequences to the rest of logic. So far as they discussed the matter, syllogistic was seen to be consequential in nature,(1) but they certainly did not make the subordinate position of the syllogism as clear as Burleigh had in the fourteenth century, or indeed as Andreas Kesler was to do in the seventeenth century.(2) A good guide to the way they viewed the problem is to see where consequences were discussed.

A very few authors, including J. Major, A. Coronel and J. Almain, devoted a whole treatise to them, but generally speaking they came in on the coat-tails of other topics so far as separate treatises were concerned.

They appear at the beginning of Dolz's treatise on the syllogism, at the end of Celaya's treatise on supposition and under 'hypothetical propositions' in the treatises on opposition written by R. Caubraith and F. Enzinas. The best places to look for a discussion of consequence turn out to be commentaries on Peter of Spain, where they appear either as an appendage to the *Parva Logicalia* or under the heading of 'hypothetical propositions', and, of course, general textbooks of logic. In these, a separate tract was sometimes devoted to consequences, as it was by C. Javellus, but more usually they were associated with the syllogism, whether as an introduction to it or, sometimes, as an appendix to it. Savonarola, for instance, said all he had to say of consequences in a section on the powers of the syllogism.

The bibliography at the end of this paper should give a fairly clear picture of the situation; though it must be noted that the majority of commentaries and textbooks belonging to the sixteenth century did not mention consequences at all." (pp. 289-290)

(1) Enzinas, *Tractatus Syllogismorum*, fo.I vo, said "syllogismus est consequentia bona et formalis . . . omnis consequentia formalis que non tenet gratia alicuius regule logicalis tenebit syllogistice." Cf. Heirich Greve, *Parva Logicalia nuper disputata*, Leipzig (149-).fo. lxxi.

(2) Andreas Kesler, *De Consequentia Tractatus Logicus* (Wittenberg, 1623). See my paper, "Andreas Kesler and the later theory of consequence," *Notre Dame Journal of Formal Logic*, vol. XIV (1973), pp. 205-214.

13. ———. 1973. "The Doctrine of *Exponibilia* in the Fifteenth and Sixteenth Centuries." *Vivarium* no. 11:137-167.

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"One of the most neglected parts of late medieval logical theory is that devoted to *exponibilia*, or those propositions which need further analysis in order to lay bare their underlying logical form and to make

clear under what conditions they can be said to be true or false. My main intention in this paper is to examine the rich array of printed sources which are available to us from the later fifteenth and early sixteenth centuries, but I will consider some texts written before the invention of printing, and I will also give some account of what happened to the theory in the late sixteenth and seventeenth centuries. The sources fall into three main groups. There are separate treatises on *exponibiles*, especially those written by Peter of Ailly(*) and later Parisian logicians; there are commentaries on the treatise on *exponibiles* attributed to Peter of Spain; and there are those parts of longer works which were devoted to 'Proofs of Terms', as in Paul of Venice and his followers. These groupings are not, of course, exhaustive. For instance, Marsilius of Inghen and George of Brussels discussed *exponibiles* in the second part of a treatise on consequences, and Albert of Saxony included *exponibiles* in the part of *Perutilis Logica* devoted to different kinds of proposition. As might be expected, the authors of the separate treatises on *exponibiles* were considerably more detailed and careful in their analysis than were those authors who treated *exponibiles* as a subsidiary matter. In my view, the two most outstanding treatises are those written by Peter of Ailly (d. 1420) and by Domingo de Soto (d. 1560). The latter is not original, but it is a very acute and thorough survey of the doctrines which were current in late fifteenth and early sixteenth century Paris, where de Soto had studied under and with such logicians as Major, Celaya and Lax, whose names will frequently occur in my text. Outside treatises devoted to *exponibiles*, good brief treatments are to be found in the anonymous commentator on Marsilius of Inghen, and in George of Brussels, (both of the later fifteenth century) and in Hieronymus of St. Mark (of the early sixteenth century). The earlier writers are often disappointing.

For instance, although Paul of Venice's *Logica Magna* is sometimes described as an encyclopedia of medieval logic, the section on *exponibiles* lacks the precise analysis of types and sub-types of *exponible* propositions found in other authors, and the examples are frequently confusing.

Similarly, the treatise wrongly attributed to Peter of Spain lacks detail, and derives most of its value from the remarks of commentators." (pp. 137-138)

(...)

"To conclude, one can say that the history of *exponible* propositions mirrors the history of medieval logical doctrines in general. At the end of the fifteenth and beginning of the sixteenth centuries there was a sudden surge of activity, during which such topics as *exponibilia*, *insolubilia* and *suppositiones* were analyzed, clarified and elaborated in works which are highly respectable from the logician's point of view, even if they contain little that is original. This period of activity was followed by a period of decline, in which medieval doctrines continued to receive some attention, especially in Spain, but they are clearly subordinated to the main business of expounding Aristotelian logic. By the end of the seventeenth century they cease ever to be mentioned." (p. 165)

[* Peter of Ailly, *Tractatus Exponibilium*, Paris c. 1495?]

[** Domingo de Soto, *Opusculus Exponibilium*, in *Introductiones dialectice*, Burgis 1529]

14. ———. 1973. "Priority of Analysis and Merely Confused Supposition." *Franciscan Studies* no. 33:38-41.

"In a recent article John J. Swiniarski discusses William of Ockham's use of merely confused supposition.(1) He claims that, in the case of universal affirmative propositions, Ockham's method of attributing merely confused supposition to the predicate accomplishes much the same result as Peter Thomas Geach's method of attributing determinate supposition to the predicate and using a priority of analysis rule, whereby the subject is always analysed first. However, he notes, Ockham's analytical procedures when applied to particular negative propositions can lead to erroneous results, which are only avoided by the adoption of a priority of analysis rule. Since such a rule renders merely confused supposition unnecessary, he concludes that Geach was right and that Ockham ought to have employed only distributive and determinate supposition to get her with a priority of analysis rule in his treatment of standard categorical propositions. I do not wish to criticize what Swiniarski has to say about the interpretation of Ockham. Instead, I wish to make a few remarks about the use of merely confused supposition by sixteenth century logicians in order to show that it is not in general so easily dispensed with. (2)" (p. 38)

(...)

"In the light of these two examples, I conclude that there was good reason for sixteenth century logicians to retain merely confused supposition, and to use Domingo de Soto's priority of analysis rule rather than Geach's." (p. 41)

(1) Swiniarski, John J., "A New Presentation of Ockham's Theory of Supposition with an Evaluation of Some Contemporary Criticisms," *Franciscan Studies*, 30 (1970), 209-217. Those readers who are not familiar with supposition theory should be reminded that merely confused supposition involves an analysis into a disjunctive subject or predicate, whereas distributive supposition involves an analysis into a conjunction of propositions and determinate supposition involves an analysis into a disjunction of propositions.

(2) For further details about supposition theory in the sixteenth century, see my paper: "The Doctrine of Supposition in the Sixteenth and Seventeenth Centuries," *Archiv für Geschichte der Philosophie*, 51 (1969), 260-285.

15. ———. 1974. "Some Additions to Risse's *Bibliographia Logica*." *Journal of the History of Philosophy* no. 12:361-365.
 "One of the greatest contributions to the history of logic in recent years was the publication in 1965 of Wilhelm Risse's *Bibliographia Logica*, Vol. I, which covers the years from 1472 to 1800. However, despite the fact that Risse's monumental work lists an estimated 8,000 logical works, it is still far from comprehensive, as Mr. Hickman pointed out in an earlier article in this journal. Why this should be the case immediately becomes apparent when one starts to work in a library such as the Bodleian at Oxford with its handwritten catalogue of books printed before 1920 and its lack of any specialized bibliographies such as the British Museum has provided for early printed books. Even in well catalogued libraries such as the University Library at Cambridge it can be difficult to locate texts, and one often stumbles across a new logical work through the accident of its being bound in the same volume as better known works. As a result of my researches over the last few years, I have put together a list of works which do not appear in Risse in the hope that other historians of logic may benefit from my discoveries. I cannot, however, claim that I have exhausted the resources of the libraries which I have visited. Doubtless there are still not only new editions but new authors left to be discovered." (p. 361)
 "This paper concerns logic texts published between 1472 and 1800. I list 20 items whose authors do not appear in Risse, 12 items whose authors appear in Risse in connection with another title or other titles, and 58 items which appear in Risse in another edition or in other editions. I indicate the libraries in which all these items are to be found, and I also list some useful bibliographical works."
16. ———. 1974. "Classification Schemes and the History of Logic." In *Conceptual Basis of the Classification of Knowledge / Les Fondements De La Classification Des Savoirs*, edited by Wojciechowski, Jerzy A., 275-283. New York - München - Paris: K. G. Saur.
 Proceedings of the Ottawa Conference on the Conceptual Basis of the Classification of Knowledge, October 1st to 5th, 1971.
 "Logic is one of the most important means of classification we have, for it enables us to appraise our reasoning by drawing the distinction between valid and invalid inferences. Its aim is a simple one, and easily stated, but when we get down to the task of specifying under precisely what conditions a true premiss set will entail a true conclusion, it seems that a whole range of different types of classification is necessary.
 Logicians commonly start by drawing the distinction between informal or natural languages and formal or artificial languages. Even at this point, divergent interpretations are possible. One can argue with the early Wittgenstein that natural language has a hidden ideal structure, which it is the task of the logician to uncover; or one can argue with the later Wittgenstein that natural language involves a series of games with different structures, any one of which the logician can choose to present as a formal language. Given both the complexities of natural languages and the variety of formal languages which have been developed, the latter interpretation is by far the most plausible. Once the notion of a formal language has been isolated, one can go on to draw the distinction between syntax, or the study of the relations of signs among themselves, and semantics, or the study of signs as interpreted, as having meaning and as being true or false. In turn we can obtain the notion of different types of logical calculi. For instance, a propositional calculus has one set of signs with certain limited transformations of these signs, and it is interpreted by the assignment of truth values to its constituent parts; whereas a quantificational calculus has a more elaborate set of signs with transformations to match, and it is normally interpreted by means of the assignment of members or sets of members of domains to its constituent parts.
 The teacher of logic is often tempted to claim that these types of classification are integral to the study of logic. This is true when logic is seen as the foundation of mathematics, but to say that only, through these distinctions can one sensibly talk about valid and invalid inferences is a much larger claim, and a more dubious one. I intend to look at selected aspects of the history of logic in order to throw some light on the problem of just what kinds of classification are necessary to the isolation of valid inferences, which I take to be the true task of logic. In particular, I shall look at the definitions of valid inference offered by the Scholastic logicians of the late fifteenth and early sixteenth centuries, since this is the historical period with which I am best acquainted. (1)" (p. 275)
 (...)
 "Are we now to conclude that elaborate classification schemes are irrelevant to the pursuit of logic, so long as we have an adequate definition of a valid inference? The answer to this question will depend in part on how much one wants out of logic.
 If one wishes to study the metalogical properties of formal systems, to obtain a complete set of rules, or to relate logic to mathematics, scholastic logic is necessarily inadequate. However, if one wishes to classify those inferences which are used in ordinary language, then one can argue that an elaborate classificatory apparatus combined with the development of formal systems will be a hindrance rather than a help. Even the simplest sentence contains subtleties which will be lost in symbolization. Moreover, there is the grave problem of which system to choose when one is symbolizing and assessing an inference. This problem has two facets. First, one may pick a system which is inadequate to one's purposes. If one attempts to show that a relational inference is valid in terms of the standard monadic

predicate calculus, one will fail. Yet one has not proved that the inference in question is not valid. Second, one may pick a system whose standard interpretation is alien to one's purposes. A logician who wishes to show that '—P', therefore 'P' holds would be ill advised to choose the intuitionist propositional calculus. Similarly a logician who wishes to show that "'Fa' therefore '(Ex)Fx'" should not choose a version of the quantificational calculus which admits non-denoting constants.

The more systematic one's approach to formal logic, the more arbitrary the choice of system seems to be, and hence the less relevant to the normal day to day task of assessing arguments. Scholastic logic, on the other hand, seems perfectly adapted to normal requirements. It is both unpretentious and powerful; it does not violate normal intuitions; and it is non-arbitrary. Or so one might think.

However, let us look a little more closely. What are we to make of the following claims? "An impossible proposition implies any other proposition." "A necessary proposition follows from any other proposition." "If you come to me I will turn you into an ass" is true provided that you do not come to me." "All chimeras are chimeras" is false because there are no chimeras, but "No chimeras are chimeras" is true for the same reason." The first two examples, the paradoxes of strict implication, follow straight from the definition of a valid inference. The third example is a consequence of the truth-functional interpretation given to promissory conditionals. The last examples are a consequence of the arbitrary decision to save the square of opposition by counting all affirmative propositions with non-referring subjects as false. Yet none of the examples corresponded to the normal intuitions of the sixteenth century. They all gave rise to acrimonious debate, and were accepted only because of the exigencies of the desired system of rules and the desired interpretation of that system. Thus even the scholastics, operating within the framework of ordinary language, were forced to make some of the arbitrary decisions which people tend to blame modern logic for. One may still prefer scholastic logic to modern logic for various reasons, but that it enshrines a true and completely non-arbitrary system of picking out valid inferences cannot be one of them.

In the last resort, the presence or absence of modern classification schemes logic does not make so much difference as one would like to think." (pp. 282-283)

(1) I intend to use the term 'scholastic logician' more narrowly than is proper, to refer to those men whom I am concerned with.

17. ———. 1974. "For Riding Is Required a Horse: A Problem of Meaning and Reference in Late Fifteenth and Early Sixteenth Century Logic." *Vivarium* no. 12:146-172.

Reprinted as essay I in: *Studies in Post-Medieval Semantics*.

"One of the most interesting features of the works of the logicians associated with the University of Paris in the late fifteenth century and the first part of the sixteenth century is their application of medieval logical doctrines to the discussion of actual examples. In this paper I intend to present a detailed study of one specific example, "For riding is required a horse" [*Ad equitandum requiritur equus*]. I shall first discuss each of the arguments that was used, showing its place in the general body of logical doctrine; then I shall present three typical texts, together with an analysis of the pattern of argument found in each. One text will deal with the problem in the context of contradiction, one in the context of conversion, and one in the context of supposition theory. In this way I hope to deepen our understanding both of the theories and of the techniques of medieval and post-medieval logic." (p. 146)

(...)

"The claim that the gerund 'riding' implies a reference to particular acts of riding, which can in turn be identified with individual horses, solved the problem of "For riding is required a horse" at the expense of raising further philosophical problems about both language and the world. However, the claim that the sentence should be regarded as equivalent either to a simple conditional or to some kind of modal proposition solved all the problems very neatly without, apparently, raising new ones. In the light of such an analysis one could maintain the truth of "For riding is required a horse" without at the same time having to argue that the sentence had the same truth-value as its contradictory or a different truth-value from its simple conversion, since these related sentences would have undergone a similar analysis, thus turning out to have the desired truth-values. Whichever solution one prefers, it seems to have been amply demonstrated that the simple minded approach in terms of personal supposition alone was inadequate. To speak of horses being required for riding is to do more than to make reference, successful or otherwise, to individual horses or any other identifiable objects in the world." (pp. 157-158)

18. ———. 1975. "Descartes' Theory of Objective Reality." *New Scholasticism* no. 49:331-340.

"In the *Third Meditation* Descartes, who is at the beginning sure only of his own existence, presents a complex proof for the existence of God which is based on the fact that he finds within himself an idea of God. I intend to ignore the supplementary proof which deals with the conservation of his existence, and to focus on his discussion of the properties of ideas, for it is here that Descartes is most difficult to comprehend yet most vulnerable to criticism. With the exception of Gassendi's remarks in the *fifth objection*, I shall concentrate upon what Descartes himself had to say, for a thorough survey of all the secondary sources often serves only to obscure the main issue." (p. 331)

(...)

"Descartes reinforced his arguments with various claims about the nature of predicates and the way in

which we come to understand them. He thought, mistakenly, that one could not only distinguish between negative and positive predicates, but that one could demonstrate the logical priority of such positive predicates as 'infinite' or 'perfect' by showing that one can only understand the finite or imperfect in the light of a prior acquaintance with the infinite or perfect. (29) However, although he seems now to be talking about epistemology rather than ontology, it turns out that his claims rest upon the same assumptions about the content and causation of ideas as are involved in the main proof, so they do not need to be discussed further.

However liberal one is in granting Descartes his desired premises, I think it is fair to conclude that his arguments do not prove what they purport to prove. This seems to be a strong indication that one will lose nothing by being illiberal from the very beginning." (p. 340)

(29) E. Haldane and G. Ross, *The Philosophical Works Of Descartes* (Cambridge, 1968), I, 166.

19. ———. 1976. "I Promise You a Horse. A Second Problem of Meaning and Reference in Late Fifteenth and Early Sixteenth Century Logic (First Part)." *Vivarium* no. 14:62-79.
Reprinted as essay II (first part) in: *Studies in Post-Medieval Semantics*.
"The logicians associated with the University of Paris in the late fifteenth and the first part of sixteenth century were at one with their medieval predecessors in their attempt to formulate a unified theory of the reference of such general terms as 'horse'. To be successful, any such theory has to give a plausible account of what happens to general terms in modal and intentional sentences, and the logicians I am concerned with clearly tried to deal with this problem. However, because of the rather standard way in which logic texts tended to be organized, the relevant material has to be sought in various places. In an earlier paper, I made a detailed study of the reference the word 'horse' was said to have in the modal sentence, "For riding is required a horse"; and in order to carry out that study, I had to draw material from the discussion of contradiction, of conversion, and of supposition. (1) In this paper, I intend to make a detailed study of the reference the word 'horse' was said to have in the intentional sentence "I promise you a horse", and my material will be drawn from the discussion of contradiction, of conversion, of supposition and of appellation. (2) I shall first examine each of the arguments that was used, showing its place in the general body of logical doctrine; then I shall present four typical texts, together with an analysis of the pattern of argument found in each.
One text will deal with the problem in the context of contradiction, one in the context of conversion, one in the context of supposition, and one in the context of appellation. In this way I hope to show what problems intentional sentences were seen to raise for the standard theory of reference, and how these problems were dealt with." (pp. 62-63)
(...)
"On the whole, it seems fair to say that the logicians I have examined failed to produce a theory of the reference of general terms which applied with equal success to all contexts. Some, like Sbarroya, found themselves forced to emphasize the difference between intentional and non-intentional contexts by postulating completely different types of referent. Some, like Heytesbury, overlooked the difference altogether in their appeal to personal supposition. Some, like Buridan, recognized that terms in an intentional context have a function which goes beyond that of referring to individual objects; but they were unable to say with precision just how this broader function was to be reconciled with the referential function. However, one thing is common to those who struggled with the logical problems caused by "I promise you a horse". That is, they managed to save the validity of those inferences they were concerned with, either by so interpreting sets of sentences that they were not to be counted as instances of the inferences in question, or by so interpreting sets of sentences that they came out to have the desired truth-values, and could no longer be cited as counter-examples to a general rule. Thus, they were successful as logicians, if not as philosophers of language." (p. 78)
(1) " "For Riding is Required a Horse": A Problem of Meaning and Reference in Late Fifteenth and Early Sixteenth Century Logic". *Vivarium*, XII (1974) pp. 146-72.
(2) Enzinas, Pardo and de Soto discussed the matter in the context of their discussion of contradiction; Celaya, Coronel (*Prima Pars*), Sbarroya and de Soto discussed the matter in the context of their discussion of conversion; Hieronymus of St. Mark and Martinez Siliceo discussed the matter in the context of their discussion of supposition; Tartaretus discussed the matter in the context of his discussion of descent; and Coronel (*Secunda Pars*), Dorp, Hieronymus of St. Mark, Major, Manderston, Mercarius and Pardo discussed the matter in the context of their discussion of appellation. It will be noted that some authors discussed the matter in more than one place. For details of the texts, see the bibliography at the end of the paper. Of the authors cited, Hieronymus of St. Mark and Sbarroya are not, so far as I know, specifically associated with Paris, though they are clearly influenced by Parisian logicians.
For medieval discussions of the problem, see P. T. Geach, "A Medieval Discussion of Intentionality" in *Logic Matters* (Oxford, 1972) 129-138, and J. Trentman, "Vincent Ferrer and His Fourteenth Century Predecessors on a Problem of Intentionality" in *Arts Libéraux et Philosophie au Moyen Âge* (Montréal/Paris, 1969) 951-956.
20. ———. 1976. "I Promise You a Horse. A Second Problem of Meaning and Reference in Late Fifteenth and Early Sixteenth Century Logic (Second Part)." *Vivarium* no. 14:139-155.

Reprinted as essay II (second-part) in: *Studies in Post-Medieval Semantics*.
Parto Two: *Texts and Analyses*.

21. ———. 1976. "Agostino Nifo's Reinterpretation of Medieval Logic." *Rivista Critica di Storia della Filosofia* no. 31:353-374.
- "A year ago, if I had been asked to give a brief account of medieval logic and its relationship to Renaissance logic, I would probably have said something like this. In the medieval period, logicians had made great advances in the areas both of semantics and of formal logic. In the area of semantics, we find lengthy and sophisticated discussions of terms, of propositions, of supposition theory, which dealt with the reference of terms in various contexts, and of *insolubilia*, or semantic paradoxes, with their far-reaching implications for our ordinary assumptions about the truth and reference of propositions. In the area of formal logic, we find equally lengthy and sophisticated discussions of *consequentiae*, or valid inference forms for both unanalyzed and analyzed propositions, and of *exponibilia*, those propositions whose logical form needs to be uncovered by means of analysis. A natural result of these advances was a relative down-grading of Aristotle. Aristotelian syllogistic was put in a subordinate place, as just one variety of valid inference, and in general the logical works of Aristotle did not receive as much attention as one might have expected. Medieval logicians were as likely to comment on Peter of Spain or to write independent treatises on particular topics as they were to comment on Aristotle; and unless they were directly discussing Aristotle, they were unlikely to pay much attention to the matters treated of in the *Analytica Posteriora*, *Topica* and *De Sophisticis Elenchis*. All this, however, was to change with the coming of the Renaissance
- Ignoring those at the University of Paris and at various Spanish universities who consciously continued the medieval tradition (2), we find two completely new developments. On the one hand there is Humanism, with its bitter attacks on medieval sophistry, its dropping of virtually all formal logic, and its emphasis on the topics. On the other hand, there is Aristotelianism, with its emphasis on the pure text of Aristotle, freed from medieval accretions, and to be interpreted either directly or with the aid of Greek and Arab commentators. These two schools certainly differed in important respects, but they were united in their rejection of what I have described as the great advances of the medieval period. Supposition theory, *insolubilia*, *consequentiae* and *exponibilia* were to be discussed no more; and terms and propositions were to appear only as described by Aristotle or by the grammarians and rhetoricians.
- My view of the medieval advances remains unchanged, but I am not now so sure about the abruptness of the change from medieval to Renaissance logic in the works of the Aristotelians of the period. In this paper, I intend to present a case study of the transition as it appears in the works of one Aristotelian, namely Agostino Nifo (or Augustinus Niphus). I intend to show that medieval doctrines were still relatively well-known to him, and were discussed by him at length; but that he presented them in a way which diminished their value and hence made them easier to abandon. Someone who knew of the theory of terms or of supposition theory, to mention just two examples, only through Nifo could well wonder what use these doctrines were, despite the apparent care with which they had been expounded, and could therefore decide to abandon them completely in his own work. Whether this is indeed what happened in the sixteenth century can, of course, only be established after a good deal of further investigation; and I present the possibility here only as a tentative hypothesis.
- (1) I would like to thank Dr. C. B. Schmitt of the Warburg Institute, University of London, for inviting me to read an earlier version of this paper as part of a series devoted to Renaissance Aristotelianism. I would also like to thank the Canada Council for the generous financial support which made the research for this paper possible.
- (2) For further discussion and bibliography, see E. J. Ashworth, *Language and Logic in the Post-Medieval Period*, Dordrecht (Holland) - Boston (U.S.A.) 1974
22. ———. 1976. "Will Socrates Cross the Bridge? A Problem in Medieval Logic." *Franciscan Studies* no. 14:75-84.
- Reprinted as essay XII in: *Studies in Post-Medieval Semantics*.
- "In their treatises on *insolubilia*, or semantic paradoxes, medieval logicians frequently mentioned other cases in which the assumption that a proposition was true led to the conclusion that it was false, and the assumption that it was false led to the conclusion that it was true. Some of these cases were easily solved. If one considers the proposition "Socrates will enter a religious order" in relation to Socrates' vow, "I will enter a religious order if and only if Plato does," and to Plato's vow, "I will enter a religious order if and only if Socrates does not," one sees at once that the problem stems from contradictory premises.(1) But not all cases were of this sort. Consider the favourite example, "Socrates will not cross the bridge," when said by Socrates, in relation to the two premises, "All those who say what is true will cross the bridge" and "All those who say what is false will not cross the bridge."(2) It is easily demonstrated that "Socrates will not cross the bridge" is true if and only if it is false, but what is not so easily demonstrated is the source of the paradox. Certainly it is not a paradox just like "What I am now saying is false," since the key proposition does not speak of its own semantic properties, but the premises do indeed speak of truth

and falsity in a way which has implications for the truth-value of "Socrates will not cross the bridge." The question thus arises whether "Socrates will not cross the bridge" is to be counted as a semantic paradox, to be dissolved in the same way as the Standard Liar is dissolved, or whether it is to be seen as needing another kind of solution, perhaps less radical in its implications for our common-sense notions about such matters as the legitimacy of self-reference or the definition of truth." (pp. 75-76)

(...)

"In conclusion, I would like to say that Paul of Venice's reputation as the last of the great medieval logicians seems to me to be vastly overrated. Several logicians of the late fifteenth and early sixteenth centuries, including Bricot, Eckius, Major and de Soto, offer more acute discussions of logical problems and more satisfactory solutions, as I hope I have demonstrated by this examination of the bridge paradox." (p. 83)

(1) Thomas Bricot, *Tractatus Insolubilium* (Parisius, 1492) sign. b. viii and sign. c i; Johannes Eckius, *Bursa Pavonis* (Argentine, 1507) sign. k v; John Major, *Insolubilia* (Parrhisiis, 1516) sign. c ii ff. Cf. Albert of Saxony, *Perutilis Logica* (Venetiis, 1522) fo. 46 vo; Robertus de Cenali, *Insolubilia in Liber Prioris Posterioris* (Parisius, 1510) sign. o iiiii.

One should note here that vows, promises and the like were treated as propositions with truth-values rather than as performative utterances with no truth-values. This view was combined with a realization that there are certain conditions which have to be met before a vow is binding. For instance, the vower must genuinely intend to do what he vows to do, and what he vows to do must be both moral and within his power. These extra conditions were not thought relevant to the question whether "Socrates will enter a religious order" was true or false.

To the slightly different question of whether Socrates would be bound by his vow, Major, for instance, held that he would not, on the grounds that his vow was conditional and that the condition, given Plato's vow, could not be fulfilled.

For references to Major's text and to other discussions of vows and promises, see below, note 15.

(2) Paul of Venice, *Logica Magna* (Venetiis, 1499) fol. 198 and Paul of Venice, *Tractatus Summularum Logice Pauli Veneti* (Venetiis, 1498) sign. e i vo. The latter work which appeared in many editions, is known as the *Logica Parva*. See also John Buridan, *Sophisms on Meaning and Truth*, translated and with an introduction by T. K. Scott (New York, 1966), pp. 219-220; Cenali, loc. cit.; David Cranston, *Tractatus Insolubilium et Obligationum* [Paris, c. 1512] sign. e iiiii; Eckius, op. cit., sign. k iiiii vo; Robert Holkot, *Super Quattuor Libros Sententiarum Questiones* (Lugduni, 1497) sign. E ii; Major, op. cit., sign. c ii vo; Peter of Ailly, *Conceptus et Insolubilia* (Parisius, 1498), sign. b. viii; Peter of Mantua, *Logica* (Venetiis, 1492), sign. o vivo; Domingo de Soto, *Opusculum Insolubilium* in *Introductiones Dialectice* (Burgis, 1529), fol. cxlvi f. Bricot, op. cit., sign. b. vii vo f. speaks of giving a penny to the truth-teller rather than of allowing him to cross a bridge, but the principle is the same. Some authors (e.g. Eckius, op. cit., sign. k v) gave both versions of the paradox, as did Paul of Venice himself (*Logica Magna* fol. 197 vo f., *Lógica Parva*, sign. e i f.) It should be noted that there are many variations in the names of the characters and in the phrasing of the propositions. Some authors substituted "You will throw me into the water" for "Socrates will not cross the bridge."

(15) It is because of this association with promising that we find the bridge paradox and others similar to it discussed in theological works as well as logical, e.g. Holkot, op. cit., sign. C iiiii ff., sign. D viii vo ff.; John Major, *In Quartum Sententiarum Questiones* ([Paris], 1519), sign. ccxcii vo ff. For general discussions of promising see, e.g., Gratian, *Decretum*, Chapter XXII (various editions) and Richard Mediavilla (or Middletown) *Scriptum Super Quarto Sententiarum* ([Venice], 1489) Book IV, distinction 38.

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