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ON PROCLUS AND
HIS INFLUENCE
IN MEDIEVAL PHILOSOPHY

EDITED BY

E.P. BOS AND P.A. MEIJER

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CONTENTS

VI   CONTENTS

BIBLIOGRAPHY

PREFACE

On 7 and 8 september 1989 a symposium was held at the University of Leiden to celebrate Professor L.M de Rijk's 65th birthday. The title of this symposium was *On Proclus' thought and its Reception in the Middle Ages*. In the present volume the proceedings are published.

The contributions are divided in two parts. The first part is about Proclus' thought, the second about its reception in the Middle Ages. In each part the texts are ordered according to the chronological order of the subjects they deal with.

The editors wish to thank E.J. Brill of Leiden for publishing this book in the series *Philosophia Antiqua*.

E.P. BOS

WILLIAM OF OCKHAM'S INTERPRETATION OF THE FIRST PROPOSITION OF THE *LIBER DE CAUSIS*[1]

I. INTRODUCTION

Even after his own works had been translated into Latin, the fifth-century non-Christian philosopher Proclus continued to influence the Christian West through the *Liber de causis* ("Book of causes"), a Latin translation of an anonymous Arab version of Proclus' *Elementatio theologica*. Among those who commented on the *Liber* were many well-known philosophers. In the thirteenth century these include Albert the Great, Roger Bacon, Thomas Aquinas, Siger of Brabant, Giles of Rome and the author of a commentary ascribed to Henry of Ghent. In the fourteenth century there is one commentary by Walter Burley, as well as Guillelmus de Levibus[2] and many anonymous commentators.[3] The fifteenth century is represented by Johannes Wenck von Herrenberg,[4] and the early sixteenth century by Chrysostomus Javellus.[5]

The *Liber de causis* stimulated authors to discuss the problem of the relation between higher (or first, or primary) and lower (or second, or secondary) causes through its first *propositio*[6] which reads:[7] *omnis causa*

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[1] I wish to thank dr. Jennifer Ashworth (Waterloo, Canada) for the correction of my English.

[2] According to A. Pelzer, 'Guillelmus de Leus (de Levibus), Frère Prêcheur de Toulouse', in: *Aus der Geisteswelt des Mittelalters. Studien und Texte Martin Grabmann zur Vollendung des 60. Lebensjahres von Freunden und Schülern gewidmet* (Series: Beiträge zur Geschichte der Philosophie und Theologie des Mittelalters, Supplementband III), Münster in Westfahlen, 1935, 1068, this William composed his *Liber causarum* between 1305 and 1309.

[3] See C.H. Lohr, 'Medieval Latin Aristotle Commentaries', *Traditio, Studies in Ancient and Mediaeval History, Thought and Religion* 23 (1967) - 30 (1974), *passim*.

[4] He died 1460; see R. Taylor, 'The *Liber de causis*: A Preliminary List of Extant Manuscripts', *Bulletin de Philosophie Médiévale* 25 (1983), 81 - 84.

[5] He died circa 1538.

[6] I shall translate *propositio* as "proposition".

[7] The first *propositio* of the *Liber de causis* corresponds to *propositio* 56 in Proclus' *Elementatio theologica* (for the Latin text, see the edition: Proclus, *Procli Elementatio theologica translata a Guillelmo de Moerbeke*, ed. C. Vansteenkiste, *Tijdschrift voor Filosofie* 13 (1951), 263 - 302; 491 - 531. *Cf.* the Greek text Proclus, *The Elements of Theology*. A Revised Text with Translation, Introduction and Commentary by E.R. Dodds, Oxford ²1963, 54).

primaria plus est influens super causatum suum quam causa universalis secunda[8] ("every primary cause exercizes more influence upon its effect than does a universal second cause").[9] The idea of a hierarchy of causes was important to Christian medieval phiosophers, because it affected the relation between God as the first cause among primary causes,[10] and the things created by God as second causes. According to Christian doctrine, God was the first and principle cause, since He had created heaven and earth and everything in it. However, a kind of causality of their own could be ascribed to both natural agents, such as fire, and free agents, such as man. Fire could be said to be the cause of heat; a man could be said to be the cause of his deeds. Indeed, one of the main reasons for assigning causality to created things was man's moral responsibility, which seemed evident to medieval philosophers.[11]

In this contribution I shall discuss the interpretation of the first proposition of the *Liber de causis* offered by the fourteenth century philosopher William of Ockham (ca. 1285 - 1347). Ockham did not write a separate treatise on the *Liber* s a whole, it seems; neither did John Duns Scotus (ca. 1265 - 1308/9), whose theory of the relation between first and second causes should also be taken into account here, since he is the object of Ockam's criticism. Both philosophers were acquainted with at least some theses of the *Liber*,[12] though I cannot determine how they came to know them, whether through an anthology, or in some other form.

A discussion of Ockham's interpretation of the first proposition may have some interest, I hope, because Ockham's view on the priority of a cause with respect to its effect, and his conclusion that sometimes a cause may be *after* its effect, not only reveals the core of his conception of causation, but also shows an important difference between his view and those of John Duns Scotus and thirteenth century philosophers on the problem of the relation between first and second causes. Ockham's view is also intriguing, because in modern analyses of causality a cause is usually said to exist *before* its effect, or to be

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[8] Edition A. Pattin: Le *Liber de causis*, Édition établie à l'aide de 90 manuscrits avec introduction et notes par A. Pattin, O.M.I., *Tijdschrift voor Filosofie* 28 (1966), 46.

[9] I have used the English translation by D. J. Brand, The *Book of Causes*, Translated from the Latin with an Introduction by D.J. Brand, Milwaukee, Wisconsin ²1984 (revised), 18.

[10] Another example of a primary cause is the sun, which can not be *the* first cause, of course (see below, § IV. 2. 1).

[11] See e.g. John Duns Scotus, *Lectura* I, 39 in *Johannes Duns Scotus, Lectura in primum librum Sententiarum, a distinctione octava ad quadragesimam quintam, Opera Omnia* XVII, Civitas Vaticana 1966, 491 [n. 40], 17 - 24, where Scotus refers to Aristotle's *De interpretatione*. For William of Ockham's view, see below § IV. 3. 1.

[12] See below § IV. 3. 1. and IV. 4. 1.

contemporaneous with it, as when motion of a hand is said to be the contemporaneous cause of the motion of the pen that is held by the hand.[13]

The core of Ockham's solution is as follows: 1) he gives a new interpretation of the priority of a first cause. As first cause God is first in perfection and limitlessness, he says, but not necessarily in time. 2) God is an immediate cause of creatures, not an indirect cause, as Duns Scotus had claimed. 3) A first cause need not to be more perfect than a second cause: the sun is less limited than a man, but not more noble. 4) God can create different creatures, not only with the help of second causes, — which is done by God *de facto* — but also on his own, because he is completely free. In general, both a free cause (like the will) and a natural cause (like the sun) can have more than one effect, which is an frequently recurring thesis in Ockham's works. 5) A corollary to 4) is that God creates many things, but, according to Ockham, this does not imply a change in God, and one need not postulate that God can only have *one* determinate effect. With this Ockham rejects Avicennean determinism, albeit in a different way from his predecessor Duns Scotus.

Three modern scholars have paid specific attention to the *background* of the text, *i.e.* to the relation between first and second causes. G. Leff, *William of Ockham and the metamorphosis of scholastic discourse* (1975) succinctly summarizes the problem. Kl. Bannach discusses it in his *Die Lehre von der doppelten Macht Gottes bei Wilhelm von Ockham*, 1975.[14] The problem is also treated by Marilyn McCord Adams in her *William Ockham*, 1987[15] in a chapter on efficient causality. None of these scholars discuss Ockham's conclusion that a cause may be later than its effect.

II. THE TEXT

In his commentary *(reportatio)*[16] on the second book of the *Sentences* Ockham interlaces two *quaestiones*, of which the contents are closely related. The title of *quaestio* iii runs:[17] *Utrum Deus sit agens naturale vel liberum* ("whether

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[13] See e.g. R. Taylor, 'Causation', *The Encyclopedia of Philosophy*, ed. by P. Edwards, vol. II, New York, London 1967, 56 - 66, esp. 65 - 66. In his article Taylor refers to other literature.

[14] Chapter III, 1, esp. p. 276 - 314. Though in general very stimulating, the book is not always as accurate as one might wish; e.g. on p. 294, Bannach says that the particular cause (as opposed to the universal cause, the sun) is "das Verfaulende" ('that which spoils') instead of any particular cause, *e.g.* a father; "*secundum veritatem*" refers to a certainty of belief, *viz.* that in his omnipotence God can act without a second cause; on p. 295 Bannach misses the point that according to Ockham the definition is correct, because otherwise any knowledge of causes would be impossible. When, *e.g.* on p. 296, Bannach suggests (by using quotationmarks) that he is quoting texts, in fact he is giving paraphrases.

[15] Part II, chapter 18, esp. p. 772 - 784. McCord Adams mentions both Leff's and Bannach's book only once in a note and does not discuss their general theses and interpretations. Her study is excellent, though I sometimes missed examples to illustrate the difficult theory.

[16] *I.e.* not a version that was authorized by Ockham himself, which would be an *ordinatio* ("authorized version").

[17] William of Ockham, *Quaestiones in librum secundum Sententiarum (reportatio)* ediderunt G. Gál et R. Wood *(Opera Theologica V)*, St. Bonaventure, N.Y., 1981, 50.

God is the first and immediate cause of everything"); that of *quaestio* iv:[18]
Utrum Deus sit agens naturale vel liberum ("whether God is a natural or a free
agent").

In his solution to the quaestions Ockham cites the story found in Daniel[19]
of the miracle of the three youths in the fiery furnace: the fire did not hurt them
because God did not immediately co-operate with the fire to produce heat.
Therefore, Ockham says, God is an immediate cause.

God is the first cause *primitate perfectionis* ("in primacy of perfection")
and *primitate illimitationis* ("in primacy of limitlessness"), but not *primitate
durationis* ("in primacy of duration"). The reason is, Ockham continues, that
when God acts as cause, the same moment (i.e. not necessarily later) a second
cause can act:[20] in this case God co-operates and at the same moment with a
second cause. It follows that God, in this case and, generally, in the present
circumstances of creation, is a *partial* cause.

Some *dubia* ("doubts") are raised that purport to deny that God is a free
agent. One of them is:[21]

> *Item, contra hoc quod dicitur quod Deus non potest esse causa cuiuslibet prima
> prioritate durationis, quia causa prima plus influit et prius quam causa
> secunda, igitur* etc.
>
> "Further, against the thesis that God cannot be the first cause of anything with
> the priority of duration: because the first cause is more influential than and prior
> to a second cause; therefore and so on."
>
> (...)

<Ockham replies>:[22]

> *Ad aliud dico quod illa prioritas sufficit in causa quod causa non existente non
> existit effectus, et ideo sicut si causa secunda causaret cum Deo, non existente
> causa secunda non est effectus, sic si causa secunda conservaret effectum cum
> Deo, non existente causa secunda non est effectus. Et ideo licet effectus
> producatur a causa prima, si post conservaretur a causa secunda, secunda
> potest dici causa illius effectus sicut prima.*
>
> *Si dicas quod conservare et creare differunt, dico quod quantum ad nullum
> positivum differunt sed quantum ad negationes connotatas, quia "creare"
> connotat negationem immediate praecedentem esse, "conservare" connotat
> negationem interruptionis esse, sicut prius dictum est. Et ideo accipiendo
> causam prout causat esse post non esse immediate praecedens, sic causa
> praecedit effectum; sed accipiendo pro illo quod continuat effectum sine
> interruptione, sic potest esse posterior.*
>
> "To the other doubt I reply that this priority is sufficient incausation, that if
> the cause does not exist, the effect does not exist. Thus, just as, if a second cause
> causes together with God, then, if the second cause does not exist, there is no
> effect, in this sense: if a second cause conserves an effect together with God,
> there is no effect, if the cause does not exist. Hence, even if an effect is produced

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[18] *Ibid.*, 51.
[19] Daniel 3, 46 - 50.
[20] *Ibid.* (see note 18), 62, 20 - 24 (this is in fact a version of Ockham's metholological
principle of parsimony, the so-called "razor").
[21] *Ibid.*, 71, 4 - 6.
[22] *Ibid.*, 75, 11 - 76, line 2.

by a first cause, if it is later conserved by a second cause, the second cause may be called, just like the first cause, a cause of the effect.

If the objection is raised that there is a difference between conservation and creation, my solution is: there is no difference in any positive respect, but <only> as regards the connoted negations. For 'to create' connotes a negation that immediately precedes being, 'to preserve' connotes a negation that being is interrupted, as has been said before.[23] If, therefore, one accepts 'cause' as far as it causes being after that immediately preceding non-being, in that sense the cause precedes its effect; but if one interprets <'cause'> for that which continues its effect without interruption <'of being'>, in that sense it can be later."

Ockham's opponent quotes the first proposition of the *Liber de causis*. It is not the text, however, that can be found in the modern edition by Pattin;[24] in the text of Ockham's *reportatio* the words *et prius* have been added to *plus influit*. This is relevant, because in his solution of the doubt Ockham's discussion is about priority in time.

III. SUMMARY OF THE TEXT

As has been said, the background of the *dubium* about priority in causation is the problem of the relation between first and second causes. The *disputant* in Ockham's text says that a first cause is more influential than and prior to a second cause. He apparently means that the first cause influences the effect that is caused by a second cause, and that this first cause exercizes a stronger influence on the effect than does the second cause. This implies, it seems to me, that the first cause acts with the same form, *i.e.* with the same formal causality, as the second cause; in this way, the first cause is also immediately linked with the effect.

Ockham replies that a first cause's priority in causation of a first cause with respect to a second cause need not be temporal. Both first and second cause can be contemporaneous with the effect, indeed, a second cause can be later than its effect and still be called "cause". Ockham defines cause in this way: it is sufficient for something to be a cause that if it does not exist, the effect does not exist. In the following chain of first and second causes: God — sun — man, in which God is the first cause, the sun the second cause and a man the effect of causation, both God and the sun can be called causes, though God is here the creating cause, the sun a conserving cause. This is true not only if God acts simultaneously with a second cause, but also if the second cause acts later, as when if a man is produced by God and the sun later conserves the man. In joint causation, God and the sun are partial[25] causes.

Someone objects that "to conserve" and "to create" have different meanings. This opponent suggests, it seems to me, that God first creates the

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[23] *Ibid.*, 65, 15.
[24] *Liber de causis* I, 1, ed. A. Pattin, 1966, 46, 1 - 2.
[25] See the *apparatus criticus*, in which MS Giessen, *University Library 732* adds *partialiter* to *conservetur*, which is logically correct.

sun, and afterwards a man, and that although God and the sun both conserve man, the sun functions man only as a sort of attribute to God on a secondary level, when it conserves man. Ockham apparently takes this objection to mean that "to create" and "to conserve" have totally different meanings.

Ockham denies this objection. "To create" and "to conserve" do have the same meaning in that both terms refer to a creature related to some other thing, *i.e.* God and the sun respectively. However, the two words differ in meaning in that their connotations *(i.e. secondary significations)* are different: "to create" connotes the negation that existence immediately precedes, whereas "to conserve" connotes the negation that existence is interrupted. According to Ockham, both God and the sun fulfill the requirements of the definition of cause. Ockham imagines that the action of the sun was suspended by God during the creation of the man, but he claims that the sun conserves the effect in existence, and that therefore it can be called a later cause.[26]

IV. COMMENTARY

I shall try to elucidate Ockham's view on the relation between first and second causes by, first, making some observations about Ancient and Medieval views up to the XIIIth century (§ IV. 1). Then (§ IV. 2) I shall discuss some distinctions used in the XIIIth century about first and second causes (§ IV. 2. 1), as well as about "essentially" and "accidentally ordered causes" (§ IV. 2. 2). Then I treat of some aspects of thirteenth century thought on the problem (§ IV. 2. 3). In § IV. 3 John Duns Scotus' view will be considered; and I shall end (§ IV. 4) my commentary by systematizing Ockham's view, and by contrasting it with that of his predecessors, especially Duns Scotus.

IV. 1 *Some observations about Ancient and Early Medieval views on the relation between first and second causes*

One might say that the Medieval philosophers inherited from Antiquity a hierarchical metaphysics according to which different levels of reality were distinguished. A reality of a higher level was superior to a reality of a lower level in many respects; realities of a higher level have the property of unity and they are prior in time; realities of a lower plurality are characterized by potency, they are potential as regards the realities of the higher level, they are later in time and so on. This hierarchy is also reflected in Ancient theories of causation.

As is well known, Medieval philosophers often used texts from Antiquity, especially texts by Plato and Aristotle, as starting-points for their investi-

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[26] *Cf.* William of Ockham, *Scriptum in librum primum Sententiarum, Ordinatio* dist. xix - xlviii, ediderunt G.I. Etzkorn et F.E. Kelley (*Opera theologica* IV), St. Bonaventure, N.Y., liber I, dist. xlv, qu. unica, p. 668, 8 - 20 and 669, 4 - 9, where Ockham says that the existence of a cause after its effect is seldom or never the case.

gations. For the problem of the relation between first and second causes, however, they did not regard the texts cited as being authoritative,[27] i.e. containing truth. Sometimes, *e.g.* Aristotle's *Metaphysics* V, xi, 1018 b 37 - 1019 a 4, is referred to, in which the Philosopher says: "Some things are called prior and posterior in this sense; again, attributes of prior subjects are called prior, e.g. straightness is prior to smoothness because the former is an attribute of the line in itself, and the latter of a surface; others according to nature and substance, *viz.* so many as can exist without other things, whereas those other things can not exist without them; this distinction was used by Plato."

According to many Medieval philosophers Aristotle did not allow for *direct* causation by the first cause on things caused by second causes, but only for *indirect* causation, *i.e.* by way of realities somewhere midway in the hierarchy between the first cause and effects of second causes.[28] One of the condemnations (proposition 43) of 1277 explicitly criticizes theories of mediate causation.[29]

Centuries later, the Christian Augustine (354 - 432) developed a view on the problem of the relation between first and second causes, which is found, for instance, in his *De Genesi ad litteram*,[30] in his *De Trinitate*,[31] and in his *De diversis Quaestionibus LXXXIII*.[32] In his *De Genesi ad litteram* (book VI, xiv,

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[27] They referred to e.g. *Physics* VIII, vi, 259 b 32 - 260 a 19, *Metaphysics* XII, vi, 1072 a 9 - 17 (so did Siger of Brabant, in Siger of Brabant, Les *Quaestiones super Librum de causis* de Siger de Brabant, édition par A. Marlasca, Louvain-Paris (Philosophes Médiévaux xii), 1972, 36); *Metaphysics* V, xi, 1018 b 27 - 29 or somewhat below in the text to 1019 a 1 - 4 (so does an anonymous commentary on the *Liber de causis* written by a *frater Simo*, which commentary is preserved in ms. Vienna, *Österreichische Nationalbibliothek, V.P.L.* 2330, f. 160 va - vb. See A. Dondaine et L.J. Bataillon, 'Le manuscrit *Vindobonensis lat.* 2330 et Siger de Brabant', *Archivum Fratrum Praedicatorum* (1966), 153 - 261; C.H. Lohr, 'Medieval Latin Aristotle Commentaries, authors Robertus - Wilgelmus', *Traditio* 29 (1973), 93 - 197. The manuscript contains Siger's commentary on the *Liber de causis* as well).

[28] Among these medieval philosophers was William of Ockham. I shall return below to his comments on what he viewed as Aristotle's theory (see below, § IV. 3. 3).

[29] See *Chartularium Universitatis Parisiensis* I, ab anno MCC usque ad annum MCCLXXXV, édité par H. Denifle et A. Chatelain, Paris 1889, 546.

[30] Augustine, *De Genesi ad litteram*, ed. J. Zycha (CSEL 28), Vienna-Leipzig 1894, IV, iii, 2; VI, xiv, 25; IX, xvii, 32 (*cf.* R.A. Markus, 'Marius Victorinus and Augustine', *The Cambridge History of Later Greek and Early Medieval Philosophy*, Cambridge 1970, 327 - 419, esp. 400).

[31] Augustine, *De Trinitate libri XV*, cura ac studio W.J. Mountain auxiliante Fr. Glorie, 2 vols., Turnhout 1968, ch. III, viii (9. 16), 143; also *De Trinitate* II, according to manuscript G (= Giessen, *University Library* 732) of Ockham's *Reportatio*, liber II, qq. iii - iv, in *Opera Theologica* V, 61, critical note to line 17: "*Augustinus, II De Trinitate, verius attribuit Deo causalitatem istorum inferiorum quam causis secundis. Potest etiam illa conclusio persuaderi sic*" ("In book II of his *De Trinitate*, Augustine assigns God as cause of the things in our created world rather than secondary causes. A persuasive argument can be given to this thesis as follows"). In this part of the text, Ockham tries to prove that each effect is more dependent on a first cause and a universal cause that is unlimited without qualification. According to this text, Ockham thinks he can give persuasive arguments for Augustine's thesis. I have not found the exact reference in Augustine's work.

[32] Augustine, *De diversis quaestionibus LXXXIII*, ed. A. Mutzenbacher, Turnhout, 1975, 70 - 75.

25). Augustine says that "causal natures (*rationes causales*) are capable of
being in two ways, *i.e.* either in the way according to which temporal things
most usually develop, or in the way unusual and extraordinary things arise
owing to God's will, which creates what is convenient to each moment of
time". Augustine apparently means that causal natures have been instituted by
God to be subject to a double causation: one is according to the natural process
of development, the other according to a miraculous causation by God.
Augustine does not seem to imply that an explanation in terms of God's
causality contradicts the explanation in terms of natural laws. God's
miraculous causality is not *against* nature, on the contrary, it perfects it.[33] What
man calls "miraculous" is in fact the perfection of nature.[34]

The main text, however, that led Medieval philosophers to discuss the
problem of the relation between first and second causes, was, as has been said
above, the *Liber de causis*, notably the first proposition.

IV. 2 *The thirteenth century*

IV. 2. 1. *Causa prima, causa primaria, causa secunda*
("first cause, primary cause, secondary cause")

In the thirteenth century, a distinction was common between *causa prima* and
causa primaria ("first cause" and "primary cause"), in contradistinction to
causa secunda or *secundaria* ("second cause" or "secondary cause"). This
distinction was also used in the fourteenth century.

According to, for instance, Albert the Great[35] primary causes are God, the
intelligences, the noble soul, *i.e.* the *anima orbium*, that is: the soul that moves
the spheres; and nature, *i.e.* *natura naturans* the general informing principle of
the natural universe, or, in other words, nature as far as it imparts motion. The
latter is a kind of immanent moving principle. Each of these primary causes
influences what follows from them in virtue of their own causality and in virtue
of the causality of an even higher primary cause. The lower the cause, the less
powerful its causality. The first cause is God.[36] In his Commentary *(expositio)*
on the *Book of Causes*[37] Thomas says that (1) the first cause helps the second

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33 *Cf.* R.A. Markus, 'Marius Victorinus and Augustine', 401.

34 *Cf.* Augustine, *De Trinitate* III, 8, qu. 16, ed. 1968, 143.

35 See Albert the Great, *Liber de causis et processu universitatis* (= Parva naturalia I),
ed. A. Borgnet, Paris (Vivès, vol. X) 1890, 316 - 619, book II, *De terminatione causarum
primariarum*, tractatus I, *De potentiis et virtutibus earum*, caput II, *De numero causarum
primariarum*, 436 a - 437 b.

36 Giles of Rome (Aegidius Romanus) (1247 - 1316) follows this lead: Aegidius
Romanus, *Opus super Authorem de causis, Alpharabium*, ed. Venetiis, 1550, f. 1r. Giles
adds that "nature" is in a certain sense an instrument of the other causes.

37 Thomas Aquinas, *Super Librum de causis expositio*, ed. H.D. Saffrey, Fribourg
(Sw.)-Louvain, 1954, 6, 22 - 28, esp. line 11.

cause to act, that (2) the first cause arrives at the effect before the second cause and that (3) the first cause leaves its effect later that the second cause.[38]

Duns Scotus and Ockham do not use, it seems, the term "primary cause" in contradistinction to "first cause". "First cause" can refer not only to God, but also to the sun and the intelligences. "Second cause" refers to causes that are created by a first cause, or stand below a first cause, and that are lower in rank, or range.[39]

IV. 2. 2. *Causae essentialiter vel accidentaliter ordinatae*
("essentially or accidentally ordered causes").

A second distinction commonly used by thirteenth century and later by fourteenth century philosophers was between *essentially and accidentally ordered causes*. They probably felt that this distinction was not clearly made in the *Book of Causes*, since this neo-platonic source seems only to have essential and formal causality in mind.

Thomas Aquinas[40] (1224 - 1274) illustrates the case of *essentially ordered causes* with the example of a craftsman moving his shoulders, the shoulders moving the arms, the arms the hands, the hands a hammer, the hammer a helmet. The causality of the hammer was brought about essentially by that of the hand, the causality of the hand by that of the arm and so on, up to the action of the carpenter himself. Hand and hammer and so on were instrumental to the causal action of the carpenter. The carpenter is the cause of the causal action of the hammer. As another example the causal chain God — sun — creatures can be given.[41]

An example given by Thomas Aquinas[42] of *accidentally ordered causes* was that of a grandfather, a father and a son. The grandfather is *not* the cause of the causal action of the father begetting a son. The grandfather's role is confined to producing the existence of the father, and he is not essential to the father's own exercise of causation in the act of begetting.

Thomas Aquinas[43] and Siger of Brabant[44] say that in *essentially ordered causes* the primary cause *intends* the effect of the secondary cause (thus the carpenter *intends* his shoulders to move his arms and so on), which is not the

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[38] So already in Plato, *Philebus* 27 a 5 - 6; see e.g. Albertus Magnus, *Summa theologiae sive de mirabili scientia Dei*, ed. D. Siedler P.A. collaborantibus W. Kübel et H.G. Vogels, *Opera omnia* XXXI, pars I, Münster in Westfahlen 1978, liber I, pars I, tr. 4, qu. 19, cap. 3, ed. 1978, 94 b - 95 b.

[39] For Ockham's definition, see William of Ockham, *Scriptum in librum primum Sententiarum, Ordinatio.* dist. xix - xlviii, ediderunt G.I. Etzkorn et F.E. Kelley (*Opera theologica* IV), liber I, dist. xlv, qu. unica, St. Bonaventure, N.Y. 1979, 667, 19 - 668, 7.

[40] Thomas Aquinas, *Super Librum de causis expositio*, ed. 1954, 9, line 26 - 10, line 3.

[41] *Ibid.*, 10, 9 - 15.

[42] *Ibid.*, 10, 3 - 8.

[43] *Ibid.*, 9, 26 - 10, 15.

[44] And an anonymous commentator whose commentary was written by brother Simo; see also above, note 27.

case in *accidentally ordered causes*. Thomas emphasizes[45] that God does
create the intelligences but does not create other things by way of the
intelligences in an essentially ordered causation,[46] so God is in direct contact
with the effects of second causes.

IV. 3. *John Duns Scotus*

For a proper understanding of Ockham's theory some texts of John Duns
Scotus have to be analysed, because Ockham criticizes Duns Scotus' approach
to the problem under consideration.

IV. 3. 1. *The texts*

The texts in which Duns Scotus' view on the relation between first and second
causes can be found, are his *Reportatio Parisiensis* liber II, dist. i, qu. iii, n. 6
(*ed. Wadding* VI, 244), his *Ordinatio*, liber I, dist. ii, pars 1, qq. i - ii, nn. 43 -
53, *ed. Vaticana* II, nn. 151 - 159) and his *De primo principio* I, 4. These
works were have written between approximately 1304 and 1308, the *De primo
principio* probably being the latest of the three.[47]

As has been said,[48] Duns Scotus probably did not write a separate
commentary on the *Liber de causis*. Unlike e.g. Ockham, who only quotes
three propositions of the *Liber* (three different propositions, each quoted
once[49]), Duns Scotus often cites propositions from the *Liber*.[50] However, he
considers their *auctoritas* not *authentica* ("not authentic", *i.e.* not containing
truth), because, in his view, the *Liber* is based on the thought of the Arab
philosopher Avicenna. For Duns Scotus, this means that it is based on an *radix
erronea* ("erroneous root").[51] As regards the problem of the relation between
first and second causes, Duns Scotus rejects the view suggested by the first
propositio of the *Liber*, that in essentially ordered causes the first cause is
predominant while the second cause has no causality of its own.[52]

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[45] Thomas Aquinas, *Super Librum de causis expositio, propositio* III, ed. 1954, 21, 21
- 22, 8.
[46] According to É. Gilson, Thomas' interpretation is a background for the interpretation
of Descartes (see Descartes, René, *Discours de la méthode*. Texte et commentaire par É.
Gilson, Paris 1925, 325).
[47] See W. Kluxen, in: Johannes Duns Scotus, *Abhandlung über das erste Prinzip*,
herausgegeben und übersetzt von Wolfgang Kluxen, Darmstadt 1974, xvi-xvii.
[48] See above, § I.
[49] See below, § IV. 4. 1.
[50] See the *Opera omnia*: in the *editio Vaticana*: vol. III: 2 quotations; vol. IV: 1; vol.
V: 2; vol. VII: 3; vol. XVI: 5; vol. XVII: 2, vol. XVIII: 4 (see the indexes).
[51] See John Duns Scotus, *Ordinatio, liber secundus, a distinctione prima ad tertiam*,
Opera omnia VII, Civitas Vaticana, 1973, 238; Johannes Duns Scotus, *Lectura in librum
secundum Sententiarum, a distinctione prima ad sextam, Opera Omnia* XVIII, editio
Vaticana, 1982, 152 [n. 163].
[52] See John Duns Scotus, *Opera omnia, ed. Vaticana* IV, 315, line 9. *Cf.* É. Gilson,
Jean Duns Scot, Introduction à ses positions fondamentales, Paris 1952, 273.

IV. 3. 2. *Duns Scotus on the relation between first and second causes*

Duns Scotus distinguishes between problems of causality and problems of concausality.[53] Some *concausae* (i.e. causes jointly operating), Duns Scotus says, are on an equal level *(ex aequo)*, as when two men draw a ship; but others are *not* on an equal level *(non ex aequo)*. Of the latter, there are two principal relations. Some *concausae* are accidentally ordered, as in the traditional example of the grandfather, the father and the son,[54] other *concausae* are essentially ordered.[55] There are three types of essential ordering. (a) Sometimes the lower cause acts because it is moved by the higher cause, as when a stick hits a ball because it is moved by an arm which holds the stick.[56] Here the hand and the stick are *partial* causes, and together they are the *total* cause of the movement of the ball. (b) Sometimes, the lower cause receives a power *(virtus)*[57] from the higher cause,[58] as when God gives power to created causes. (c) Sometimes, the lower cause receives its form from something else, while it merely receives its actual movement from the higher cause. In the text of the *Ordinatio*, Scotus does not give an example to illustrate this member of the division, but he probably means the case of intellection, where two causes, *i.e.* the intellect and the object known, cause the act of intellection.[59] I shall concentrate on causal chain (b), which occupies Ockham's attention.

In his *De primo principio*[60] Duns Scotus says that in this essential order: God — created cause — effect, there is an *indirect* causality. God is the *remote* cause, the created cause (*i.e.* the sun) is the *proximate* cause. The effect depends essentially, Scotus says, on the *proximate* cause (*i.e.* the sun), and that for three reasons. 1) The effect can not exist if this proximate cause does not exist. 2) The causality of the cause is related to the effects in a well-determined order, and conversely, the effect and the proximate cause are essentially related to each other insofar as far as both are related to their common cause, *i.e.* the remote cause. Hence, the order between second cause and effect is also well-

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[53] Just like Thomas Aquinas: *cf.* L. Schütz, *Thomaslexikon*. Sammlung, Übersetzung und Erklärung der in sämtlichen Werken des h. Thomas von Aquin vorkommenden Kunstausdrücke und wissenschaftlichen Aussprüche, Paderborn 1895, 143, *sub voce.*

[54] See above § IV. 2. 2.

[55] See also *De primo principio* I, 4.

[56] Duns Scotus, *Ordinatio* II, dist. xxxvii, qu. 2, n. 7, ed. Vivès, vol. xiii, 1893, 373 a - b; *Reportatio* III, 4, qu. 2, n. 8, ed. Vivès, vol. xxiii, 1894, 275 a.

[57] According to the modern edition *(Ordinatio* I, dist. iii, pars 3, qu. 2, *Opera omnia, ed. Vaticana* III, p. 293, l. 10) Duns Scotus later added: *"seu forma"* ("or form").

[58] *Reportatio* III, 4, qu. 2, n. 8, ed. Vivès, 1894, 275 a.

[59] In this essential order, no movement, or virtue is imparted: instead, the higher cause possesses in itself a more perfect power than the lower cause. The example, Scotus gives, is of a father (in himself the higher cause) and a mother (in herself a lower cause) in begetting a child *(Reportatio* III, 4). The father and the mother are two partial causes in a special order. Both are necessary causes; separately, each is not a sufficient condition for the generation of a child. Other examples are: the sun (a higher cause) and a created cause (a lower cause) as regards a created object, e.g. a man *(Reportatio* II, 1).

[60] *De primo principio* I, 4, ed. W. Kluxen, 1974, 6.

ordered. 3) God is the proximate cause of the second cause. The effect of the
second cause is not produced by the remote cause *as remote*.

I conclude first that in this chain of causality, the first cause is *superior* in
all respects: it is more perfect, it is less limited. Duns Scotus does not say that
it is prior in duration. On the contrary, he maintains that essentially ordered
causes are simultaneous. So God is prior in all respects. The order God — sun
— lower creatures is fixed in the sense that the sun does not cause without
God, and the reverse, that God does not create without the sun, and that the
effect is directly caused by the sun.

Second, there is an *indirect* causation, for God is indirectly related to the
effect. God causes the sun, the sun the lower effects. God cannot produce an
effect without the created cause, so in this sense God depends on the created
cause; in Himself, however, God is superior.[61]

Criticizing Averroes Duns Scotus says[62] that only imperfect things can be
produced by an equivocal cause, and that, just because of their imperfection.
Here by "imperfect things" he means not men, animals and so on but the
products of putrefaction; and by an equivocal cause he means God, into whose
definition the notion of putrefaction does not enter. It is called "equivocal"
because it is is not caused itself. In his theory of causation Duns Scotus
emphasizes order in reality; only imperfect things can be produced by
something of another nature than the thing itself.[63]

Duns Scotus says elsewhere[64] that the first cause *contains virtually (con-
tinere virtualiter)* both the second cause and the effects, and Ockham at least
had the impression that according to Duns Scotus, these effects can be deduced
from a higher cause.[65] In Duns Scotus' works "virtual containment" is the
primary notion used to express the relation between first and second causes.[66]
He uses the notion of *intention* only for instrumental causation (e.g. of a living
organism, using its hand to feed itself).[67]

A problem many Medieval philosophers found difficult was how God
could produce *changeable* things different in species and number, without
Himself being multiplied or changed. A fundamental conception in Duns
Scotus' works is that a thing *in itself* is ontologically prior to any *manifestation*
of the thing, or to the thing in its outward relations. According to these

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[61] Ockham gives Scotus' view from Scotus' *Ordinatio* I (see above, § IV. 3. 1).

[62] Duns Scotus, *Ordinatio* I, dist. ii, pars 2, qu. 4, ed. *Vaticana* II, esp. p. 322 [n. 327].

[63] *Cf.* below, § IV.4.3.

[64] *E.g.* Duns Scotus, *Lectura*, prologus, pars 2, qq. 1 - 3, p. 26 [n. 66].

[65] *Cf.* L. Honnefelder, *Ens in quantum ens. Der Begriff des Seienden als solchen als
Gegenstand der Metaphysik nach der Lehre des Johannes Duns Scotus* (Series: Beiträge zur
Geschichte der Philosophie und Theologie des Mittelalters, Neue Folge, Band 16), Münster
in Westfahlen 1979, 5 - 7.

[66] *Cf.* above, note 11.

[67] *Opus Oxoniense*, liber IV, dist. VI, qu. 5, n. 6 - 8.

principles God in Himself is *immutable*, whereas He can produce mutable things. God's mind changes insofar as he forms acts of intellection.[68]

IV. 3. 3. *Conclusion*

In Duns Scotus' works, contingency and God's omnipotence do not play a part in the same degree as they played in Ockham's works, as we shall see below.[69] The central notion is that of a hierarchical order among causes, though in some cases there is no influence from the higher cause to a lower, for instance in the generation of a child, where there is no influence from the father on the mother,[70] and in the production of an act of knowledge.[71] Duns Scotus emphasizes the order in reality which is determined by God. For instance, an accidental property (be it corporeal or incorporeal) is less perfect than a substance; in a chain of essential causation a first cause is equivocal (because it is not caused itself) and therefore more perfect than the second causes. Accidents and second causes cannot act without the action of a substance and first cause.[72] Unlike Thomas Aquinas for instance, Duns Scotus defends the view that a first cause acts simultaneously with a second. The first cause has the primacy of influence. He probably means that the first cause can act without the help of a second cause, but he is not very clear on this point. He does allow this type of causality when *imperfect* effects are caused, for instance the effects of putrefaction can be produced without the help of a second cause.[73]

IV. 4. *William of Ockham*

This part of my article runs parallel to that on Duns Scotus in order to facilitate a comparison. As has been said in the introduction, Ockham's interpretation of the first proposition of the *Liber de causis* primarily separates the concepts *priority in duration* and *causation*. The background is the problem of the relation between first and second causes.

IV. 4. 1. *The texts*

There are three passages in which Ockham explicitly discusses the problem: (1) *Reportatio* II, qq. iii - vi: (qu. iii: "Whether God is the first and immediate cause of everything"; qu. iv: "Whether God is a natural or a free agent"; qu. v: "Whether God is the cause of everything according to the intention of the

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68 *Ordinatio*, liber I, dist. viii, pars 2, qu. unica (*Opera omnia*, ed. *Vaticana* IV, 1965, 321 [n. 293]).
    69 See below, § IV. 4. 2.
    70 *Ordinatio* I, dist. iii, pars 3, qu. 2, p. 496.
    71 *Ordinatio* II, dist. xxxvii, qu. 2, n. 7.
    72 *Opus Oxoniense* IV, dist. xii, qu. 3, nn. 13 - 15 (ed. *Wadding* VIII, 744 ff.);
Reportatio Parisiensis IV, dist. xii, qu. 3, nn. 9 - 11 (ed. *Wadding* XI, p. 686).
    73 See also below, § IV. 4. 3.

philosophers"; qu. vi: "Whether it is a contradiction: a creature has the power
to create");[74] (2) *Ordinatio* I, distinction ii, qu. x: "Whether there is just one
God";[75] and (3) *Quaestiones in Physicam*, qq. 132 - 134 (qu. 132: "Whether in
essentially ordered causes the second cause depends on the first"; qu. 133:
"Whether in essentially ordered causes the superior cause is more perfect"; and
qu. 134: "Whether essentially ordered causes are necessarily simultaneously
required to produce an effect with regard to which the causes are essentially
ordered"[76]). Of these texts the *Reportatio* was written, according to the modern
editors[77] in 1318 or somewhat earlier, the *Ordinatio* in about 1317 - 1319,[78] the
Quaestiones in libros Physicorum Aristotelis was written 1323 - 1324.[79]

IV. 4. 2. *Ockham on God's priority in causation*

In answer to the opponent's interpretation of the first proposition of the *Liber
de causis*[80] Ockham first says, that, though God, as first cause, has primacy of
perfection and of limitlessness. He need not be prior in duration to a second
cause, because the causality *may* be *simultaneous*. Simultaneity, he says,[81] is
accepted by Aristotle. Traditionally it was said[82] that a first cause operates in
time *before* a second cause.

This conclusion follows from Ockham's definition of causality. In our
text, the definition is very meagre: "if a cause does not exist, an effect does not
exist."[83] Though this definition seems to apply to the efficient cause, Ockham

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[74] Liber II, qq. iii - vi, *Opera Theologica* V, 1981, 50 - 98.
[75] William of Ockham, *Scriptum in librum primum Sententiarum, Ordinatio*, dist. ii-iii
edidit S. Brown adlaborante G. Gál *(Opera theologica* II), St. Bonaventure, N.Y., dist. II, qu.
x, 1970, 337 - 356.
[76] *Opera Philosophica* VI, 1984, 753 - 762.
[77] See the introduction to the edition, p. 26*.
[78] See William of Ockham, *Ordinatio, prologus et distinctio prima, Opera Theologica*
I, 34* - 36*.
[79] See the modern edition, *Opera Philosophica* VI, 41*. Some scholars have raised
problems concerning the *Quaestiones in Physicam*. According to G. Leibold, 'Zum
Authentizität der *Quaestiones in libros Physicorum* Wilhelms von Ockham',
Philosophisches Jahrbuch (1973), 368 - 378 it is a collection of older texts of Ockham, not
arranged by him. He adduces some passages to show that the texts can be found elsewhere in
Ockham's works, and that no doctrinal development is involved. Vl. Richter agrees with
Leibold (Vl. Richter, 'In Search of the Historical Ockham: Historical Literary Remarks on
the Authenticity of Ockham's Writings', *Franciscan Studies*, vol. 46, Annual XXIV, 1986
(William of Ockham (1285 - 1347), Commemorative Issue, Part III, 1988), 93 - 106, 96)
writing as if Leibold had denied the authenticity of the questions in any strong sense, in §
VI, 2 of the modern edition of Ockham's text, Brown argues that the *Quaestiones* is,
contrary to Leibold's opinion, authentic. A. Goddu *(The Physics of William Ockham*, Leiden
- Köln 1984, 5) thinks it is indeed a compilation, and authentic. I add that it may be a
compilation, and that nobody, Leibold included, denies this, but there are (albeit small)
changes and developments in the *Quaestiones* (1984, 5), so parts of the text may be of an
early date, *i.e.* those that can be found in the *Ordinatio*, see below, § IV. 3. 5
[80] See above, § III.
[81] Ockham, *Ordinatio*, liber I, dist. ix, qu. iii, *Opera theologica* II, 1970, 299, 3 - 4;
Ockham does not explicitly refer to a specific passage in Aristotle's works.
[82] *Cf.* above § IV. 2. 2.
[83] *Cf.* M. McCord Adams, *William Ockham*, 1987, 798.

often calls the cause *causa productiva* ("a producing cause"), which is a more general formula.[84] Thomas Aquinas notes that Proclus uses the verb *"producere"* to express the causality alone of the efficient cause,[85] so no specific kind of causality is meant. In his omnipotence God can produce any creature immediately and totally, Ockham says. He criticizes Aristotle because, in his opinion, Aristotle only accepts mediate causation.[86]

In his commentary Ockham also concludes that a cause may be *later* than its effect, as when the activity of the sun is suspended by God's omnipotence and when the sun exercizes its conserving function later. Here the sun is the cause of an effect which already exists, because the effect has already been created by God. In his *Reportatio*[87] Ockham adds that the case of a cause being later than its effect cannot be maintained assertively, probably because he is speaking of things that are not according to the established laws of nature and that are completely in God's power. Here Ockham abandons a strictly hierarchical chain of causation as it is found in Duns Scotus.[88]

Ockham is interested to safeguard God's *immediate causation*. Beyond this, God gives creatures a causation of their own: He co-operates with them in a joint causality. He does not exercise his full power, however. Ockham gives the example of a father and a son carrying a burden of ten[89] stones. The father could carry the stones alone; he carries most of the burden, and carries it directly and immediately. However, the father does not exert his full strength, for he lets his son play his own part. If the son fails, the son is to be blamed, whereas the father is not.[90] In the same way God co-operates with created causes, hence God and creatures are *de facto partial* causes of an effect.[91]

In the Prologue of his *Commentary on the Sentences,* Ockham criticizes Henry of Ghent for advocating that there are two total causes of the same effect. Ockham opines that, when God is the indirect or remote cause and a lower cause is a proximate cause of the same effect, both are partial causes. In the modern edition[92] it is noted that numerically the same son can be the son of one or another father, Duns Scotus implies, it seems, that either can be the total cause. This remark may have misled Ockham.

Like Duns Scotus, Ockham says that, although God can produce something without the help of a second cause, in the present circumstances He

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[84] *Cf.* G. Leff, *William of Ockham*, 1975, 388 - 390.

[85] Thomas Aquinas, *Super Librum de causis expositio*, ed. 1954, 8, 29 - 9, 1.

[86] See *Reportatio* II, qu. v, *Opera Theologica* V, 1981, 87, 2 - 12.

[87] William of Ockham, *Reportatio* II, qq. iii - iv, *Opera Theologica* V, 1981, 64, 7.

[88] See above, § IV. 3. 2.

[89] For "ten" *(decem)* in "ten" stones: this addition is based on the *apparatus criticus, ad locum,* version in manuscripts G and L (Olmutii, *Bibliotheca Capitularis,* C. O. 327 of the modern edition).

[90] *Reportatio* II, qu. iii - iv, *Opera Theologica* V, 1981, 72, 3 - 20.

[91] *Ibid.*, II, 3, 63, 19 - 25.

[92] P. 64, note 2.

co-operates, which is also a partial cause, with a second cause, also being a
partial cause.[93]

IV. 4. 3. *Ockham's criticism of Duns Scotus*

In two passages Ockham criticizes Duns Scotus' theory about the relation
between first and second causes. The first passage is in book I, dist. ii, qu. x.[94]

A. The first main point of criticism is Duns Scotus' argument that the
second cause was dependent on the first in its causation. Ockham rejects this
view. He says that there are three possible interpretations of "dependence".

1. The first is that a first cause is *necessary to* the causality of a secondary
cause; however, this is not always the case. In many cases a first cause also
needs a second cause (*e.g.* the sun can not act without other created causes in
producing an effect). Though Ockham criticizes Duns Scotus on this score,
Scotus in fact said the same.[95]

2. The second interpretation is that a second cause is dependent *for its
existence* on a first cause. According to Ockham (2. 1) this is only applicable to
accidental causes (*e.g.* the relation of father to son) and (2. 2) along these lines,
the cause of a cause would be the cause in itself of an effect. The miracle of the
eucharist, however, shows that sometimes the substance, notably the substance
wine, which is the cause of accidents such as its quality red, is not the cause of
the effects that are caused in the sacrament, because the substance has changed
into the substance of the blood of Christ.

3. The third interpretation is that a second cause *receives influence, or
active power* from a first cause. This cannot be, Ockham says, because (3. 1)
often a second cause does not receive a form from the first. The example
Ockham gives is the sun and lower second causes, such as a father, who does
not receive the form of the sun. It should be noted, however, that Duns Scotus
acknowledges this case.[96] (3. 2) Another example is an object of learning and
the intellect which are two partial causes of an act of intellection. The object,
Ockham apparently means, is the second cause, the intellect a first cause; both
causes act according to their own power, however. Here, Ockham criticizes
Thomas Aquinas, as Bannach was correct in thinking.[97] Duns Scotus also
acknowledges this case.[98]

B. The second main point of criticism is Duns Scotus' claim that a first
cause is more perfect than a second cause. Ockham replies: either (1) the first
cause is primary in respect of perfection, and then the phrase is tautologous; or
(2) a first cause is less limited than a secondary cause. And this is false. A less

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[93] *Reportatio* II, qu. iii - iv, *Opera Theologica* V, 1981, 63, 19 - 25.
[94] See above, § IV. 4. 1. He repeats the criticism in his *Quaestiones in libros
Physicorum*, qq. 132 - 134 (*Opera Philosophica* VI).
[95] See above, § IV. 3. 3.
[96] See above, § IV. 3. 3.
[97] Kl. Bannach, *Die Lehre der doppelten Macht* ..., 1975, 293.
[98] See above, § IV.3.3.

limited cause (*e.g.* the sun) is not more perfect than a limited cause (*e.g.* a man or an ass), for a living being endowed with senses is always more perfect than an unanimated being without senses. Duns Scotus did not pay attention to this counterexample, it seems. Perhaps he thought only in terms of a hierarchy of causes, where the higher cause is more universal and more perfect.

C. The third main point of criticism is Duns Scotus' claim that a first cause never acts without a second cause, so that causation is simultaneous. Ockham denies this, for, he says, there is the counterexample of spontaneous generation where a universal cause acts without a particular cause. Ockham accuses Duns Scotus of a contradiction,[99] because, according to Ockham, Duns Scotus did acknowledge the counterexample. Duns Scotus, however, only accepts it for the case of the production of imperfect beings.[100] Ockham acknowledges God's direct causality without the help of second causes with respect to all existent creatures, whereas Duns Scotus accepted it only for imperfect beings, namely the products of putrefaction.[101].

In an objection it is said, that a second cause would be superfluous. Ockham denies this. He refers to his *Reportatio*, liber II, questions iii - iv, in which he emphasizes the part played by the second partial causes in the present order of creation. It is only according to his absolute power that God is a total cause. Here, Ockham takes miracles into account.

Elsewhere, Ockham criticizes[102] Duns Scotus' view[103] that everything would be *virtually contained* in the first subject of a hierarchy. This first subject, God, is the first cause, and every second cause and every effect would be in some way contained in it. This view seems to imply that everything is demonstrable by way of the first subject. Ockham clearly thinks that this way of thinking leads us away from any empirical knowledge: everything would be logically deducible from the highest principle.

In the *Reportatio* II[104] the problem is raised of how God can produce many things given that He must remain the same, and given that from one thing only one thing results, whereas a plurality of effects implies a plurality of powers, which is impossible in the case of God.[105] Ockham solves this problem by saying that according to faith God can produce many things immediately, and, moreover, that the opponent's view is against reason. The will is a single power with a plurality of effects, since it is a power both to will and not to will.

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[99] Ockham apparently refers to Duns Scotus', *Ordinatio, liber primus, distinctio prima et secunda, Opera omnia* II, Civitas Vaticana, liber I, dist. i, qq. i - iv, n. 327 - 37, 1950, 322 - 328.
[100] *Ibid.*, 327; McCord Adams (*William Ockham* ,1987, 783) does not discuss the passage and therefore fails to give a more detailed description of Duns Scotus' view.
[101] *Cf.* above, § IV. 3. 2.
[102] See esp. *Opera Theologica* I, 229.
[103] See § IV. 3. 2.
[104] P. 56, 12 - 13.
[105] *Cf.* above, § IV. 3. 2. See *Reportatio* II, qq. iii - iv, *Opera Theologica* V, 1981, 56, 13 - 19.

Similarly, a natural cause like the sun can produce many things while in itself remaining the same, and, finally, one cause can have specifically different effects.[106] For a cause remains the same in producing many things that are specifically or numerically different. Ockham's conclusion is the same as that of Duns Scotus, though his principles of explanation are different: he does not distinguish a thing in itself and its manifestations as different ontological levels.

To my mind, Ockham does not accept the traditional distinction between essentially and accidentally ordered causes, for his notion of *causality* is that of efficient causality, in which forms or intentions do not play a part.

V. CONCLUSIONS

At this point it is possible to draw some conclusions.

1. In Ockham's text discussed above (*Reportatio* II, qq. iii - iv), Ockham's definition of "cause" (*i.e.* "when a cause does not exist, an effect does not exist") is of what he prefers to label a "producing cause" which strongly resembles Aristotle's "efficient cause".

2. Ockham does not, it seems, accept a distinction between essentially and accidentally ordered causes.

3. Unlike Thomas Aquinas, for instance, Ockham does not assign primacy in duration to the first cause. The first cause may be simultaneous with the second cause (in this respect Ockham agrees with Duns Scotus)

4. Ockham allows for a cause to be after its effect, though this is not a case of normal causality, but happens only rarely as a result of God's absolute freedom (*de potentia absoluta*).

5. One of Ockham's principles is that a cause may have specifically or numerically different effects while the cause in itself is not changed. Ockham argues for this conclusion from different principles than Duns Scotus.

6. Ockham defends God's immediate causality with respect to his own effects and the effects of second causes. In other words, Ockham strongly rejects Duns Scotus' theory of indirect causality by a first cause, when it operates together with a second cause.

7. Ockham rejects what he — wrongly — sees as Duns Scotus' idea of one effect having two total causes.

8. Ockham denies Duns Scotus' notion of virtual containment in causes that are essentially ordered.

9. He denies any absolute superiority of higher realities (e.g. the sun as opposed to a man). The second cause is not ontologically higher than its effect

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[106] That one cause can have two specifically different effects, and that one effect can be produced by two specifically different causes is a fundamental and often recurring doctrine about causality in Ockham's works.

in all respects, as philosophers before him, especially the thirteenth century, had held.

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History of Logic: Medieval

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Seven 'liberal arts' constituted the curriculum at a medieval arts faculty. The three 'trivial' arts Grammar, Logic (*Dialectica*), and Rhetoric deal with the use of words rather than with (real) things. These are dealt with in the four mathematical arts – Geometry, Arithmetic, Astronomy, and Harmony (Music) – that comprise the *quadrivium*. The specific logical art is concerned with *reasoning*. The logical tradition is as old as Aristotle and history knows periods of intense logical activity. Thus the subject is known under many names and, at different times, knows varying boundaries. Aristotle did not use the Greek *logikè* for the logical art, but preferred *ta analytika* (from the verb *analuo*: to resolve (into premises or principles), from which the names of his 'sweet Analytics,' that is *Analytica priora and posteriora* derive. The Greek *logos* can be found in the writings of both Plato and Aristotle, where it stands for (the smallest meaningful parts of) 'speech' whereby something can be said. The Greek logical terminology was latinized by Cicero and Boethius, and the honour of having named the subject belongs to the former who coined *Logica*. 'Dialectica', the alternative Platonic and Stoic name for logic as part of the *trivium*, derives from the Greek for conversation, since, in this tradition, thinking is seen as the soul's conversation with itself. The dialectician investigates relations between (eternal) ideas which have to be respected if the thinking were to be proper. In the sixth century the logical works of Aristotle – *Categories, On Interpretation*, the two *Analytics*, the *Topics*, and *On Fallacies* – came to be seen as an *Organon* (instrument, tool), and the term has stuck, for example in *Novum Organon* (1620), that is, Francis Bacon's attempt to emend Aristotle's instruments for reasoning.

These names, under which the discipline has been known, relate to different aspects of logic, or of how the subject should be seen. 'Logic,' thus, would be the study of (the use of words for making) reasoned claims, and 'Analytics' resolves reasoning into simpler parts in order to provide grounds. 'Dialectics' grounds reasoning in (eternal) relations between logical entities, whereas when logic is thought of as an organon, it serves as the tool for multiplying knowledge through the use of reasoning.

The purely *formal* logic of today is regularly confined to theory of (logical) consequence between well-formed formulas (WFFs). An analogous position within medieval logic would cover only the topics dealt with in the Prior Analytics. Medieval logic, however, covers a much wider range: it comprises also topics from philosophy of

language, for example the theories of signification and supposition (reference), episte-
mology, for example the theory of demonstration, and philosophy of science (method-
ology), for example the method of analysis and synthesis. Indeed, logic is sometimes
divided into Formal logic versus Material logic, which correspond to Aristotle's two
Analytics, and cover, respectively, the theory of consequence and the theory of demon-
strations (or proofs). Today's logician is primarily a 'dialectician' who studies relations
among logical entities, be they meaningful sentences, (abstract) propositions, or the
well-formed formulae of a formal language. The medieval logician, on the other hand,
was primarily concerned with the exercise of the faculties of the intellect. The use of
reasoning as part of the (human) act of demonstration was his main concern. Today
the theory of consequence holds pride of place in logic over and above the theory of
demonstration (which is commonly not even seen as a part of logic), but in medieval
logic their order of priority was the opposite. The Posterior Analytics was in no way
inferior to the Prior Analytics. The medieval logician does not primarily study conse-
quence-relations between logical entities; his concern is the act of knowledge that is
directed toward real things.

However, prior to studying proper acts of reason, one has to take into account
also two other kinds of acts, since reasoning proceeds from judgments that are
built from terms. In the first instance, the latter two notions are also the products of
mental acts according to certain operations of the intellect, namely apprehension and
judgment.

The medieval teaching on the act of reason can be summarized in tabular form:

	Operation of the intellect	Inner product of the act	Outward sign
I	*(Simple) Apprehending, Grasping*	Concept, Idea, Notion, (Mental) Term	(Written/spoken) Term
II	*Judging,* Composition/Division of two (mental)terms	Judgment (made), (Mental) Proposition: *S* is *P*	(Written/spoken) Assertion, Proposition
III	*Reasoning,* Inferring	(Mental) Inference	(Written/spoken) Inference, Reasoning

Its influence is still visible in the nineteenth century, after half a millennium, when tra-
ditional textbooks still show the time-honored structure, comprising the three parts:
Of Terms, Of Judgement and Of Inference (sometimes adding a fourth, post-*Port
Royal Logic* (1662), part: Of Method). It must be stressed that the medieval notion
of 'proposition' that occurs twice in the second row, either as the traditional
subject/copula/predicate judgment made, that is, the mental proposition, or as its
outward linguistic guise, is *not* the modern one. The term *proposition* enters contempo-
rary logic as Bertrand Russell's unfortunate (mis-)translation of Frege's *Gedanke*
('Thought'). Thus, modern propositions are not judgments, but *contents* of judgments.
As such they may be given by nominalized that-clauses, for instance

that snow is white,

which emphasizes their being abstract contents. This, though, is not the way to think of medieval propositions, which are not contents, but combinations of terms S and P, for instance,

[snow is white], and [Sortes is a man].

(The fourteenth-century *complexe significabile*, though, plays a role that is somewhat analogous to that of the modern notions of proposition (content).)

In medieval logic there is a complete parallelism between thought and reality, between mind and world. The important idea of carrying out purely mechanical, 'formal,' proofs, irrespective of content, emerges only with Leibniz, and does not yet form part of the medieval tradition in logic. Owing to this logical 'picture theory' *avant la lettre* for the relation between mind and world, the theory of categories, especially in the form of simple predications, or *categorizations*, [a is an α], is sometimes seen as part of logic (as well as of metaphysics).
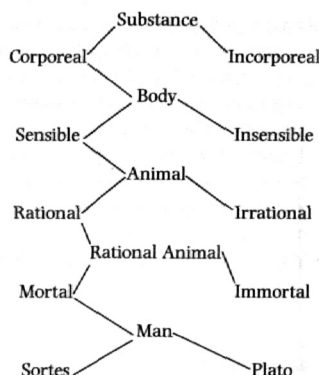
The medieval theories as to the truth of propositional combinations of terms – categorical predications – vary. According to one theory, the (extensional) *identity* theory, the proposition [S is P] is true when the supposition of both terms is the same, that is, when both terms stand for the same entity. Thus, for instance, the predication [Sortes is a man] is true when [Sortes] and [man] both supposit for the same entity, namely Socrates. The main rival of the identity theory of truth is the (intensional) *inherence* theory. According to it, the proposition [Sortes is a man] is true when *humanity*, the property of being a man 'inheres' in (is contained in) the nature of what *Sortes* stands for, namely, Socrates. In modern historical studies the rivalry between these medieval theories is sometimes seen as absolute. However, sometimes a philosopher is committed to (uses of) both conceptions. It seems more likely, though, that the alternative conceptions of truth-conditions pertain to different kinds of predication, than that the philosopher in question wavers between two absolute, all-encompassing theories. For instance, the substantival predication [Man is an animal] is held to be true because the terms man and animal stand for the same entity, whereas the denominative predication [A man is white] is deemed true because whiteness inheres in what man stands for.

A propositional combination of terms can be just apprehended, that is, grasped or understood; it need not be judged, or, when considered in the exterior mode, asserted. Of course, the medieval logicians also realized that not all traditional judgments have categorical [S is P] form. There are also hypothetical and disjunctive judgments, which take, respectively, the forms

[if J_1, then J_2] and [J_1 or J_2],

where J_1 and J_2 are judgments.

Terms can be divided into *general*, for instance, *man*, and *singular*, for instance, *Sortes*. Accordingly, by the correlation between world and mind/language, so can their significations, that is, there is a matching division of singular and general natures. We then get hierarchies of terms that can be ordered in a so-called *Porphyrian tree*:

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                    Substance
        Corporeal                Incorporeal

                      Body
        Sensible                 Insensible

                     Animal
        Rational                 Irrational

                  Rational Animal
        Mortal                   Immortal

                      Man
        Sortes                   Plato
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With respect to such trees, we encounter reasonings based on predications:

Sortes is a man, and man is a rational animal. *Therefore*: Sortes is an animal.

We can, however, ascend in the Porphyrian tree:

An animal is a animate living body. *Therefore*: Sortes is a living body.

Apparently, predication is transitive when climbing in a Porphyrian tree: what is predicated of a predicate of a subject, can be predicated also of the original subject.
    However, not all categorical predication is transitive: the two premises

Sortes is a man and Man is a sort,

obviously, do not allow for the nonsensical conclusion

Sortes is a sort.

In order to account for the failure of transitivity in the case of iterated predication, contemporary logical semantics relies only on a (meager) *reference* relation, both relata of which, namely, the expression and its reference, are construed as *things*. Medieval logic, to its credit and great advantage, draws upon a richer spectrum of semantic notions. In effect, the medievals split our modern notion of reference into two notions, namely signification and supposition. The language studied by medieval logicians is a highly stylized, technical Latin, with rigid syntactic rules and clear meaning and in this it resembles, not our current metalinguistic predicate-calculus, but rather those interpreted formal languages that were used by Frege and others to inaugurate modern logic. The carefully crafted systems of the Polish logician Stanislaw Lesniewski are particularly close to the medieval perspective, since they were cast in the mold of traditional logic, using the [S is P] propositional form, rather than the modern, Fregean function/argument form [P(a)], as their point of departure. The expressions of these

formal languages were not seen just as things, but as *signs*, where a sign signifies by making manifest its signification to mind. The notion of *signification* is the closest medieval counterpart to our modern notion of reference. Thus, for instance, the signification of the name *Sortes* is the man Socrates and the signification of the general name *man* is such that the name can be rightly predicated of men. Signification is context-independent, but medieval logic also knows a context-sensitive notion, namely that of *supposition*. Supposition primarily applies to terms that occupy the subject position in [S is P] propositions. The supposition of a term, in a certain propositional context, is what the term stands for in the context in question. What supposition the subject term S takes depends on the signification of the predicate P. In the proposition

[*Sortes* is a man]

the term *Sortes* has personal supposition, because it stands for the individual Socrates. If we consider the true propositions

[Man is a sort] and [Man is a word]

the term *man* has moved from predicate to subject position. In the proposition

[Man is a word]

it has *material* supposition, because it stands for the word and not the person whence the modern use of quotation-marks is superfluous. It is the term man that has material supposition and not the term 'man.' This reverses current (Carnapian) terminology, where, when speaking about the word, one uses the 'formal,' rather than 'the material mode of speech.' The medieval terminology *material* and *formal* supposition probably derives from the fact that, under the influence of Aristotle's theory of hylemorphism, the subject S is seen as the *matter* of the categorical [S is P]-proposition, and the predicate is its *form.* Similarly, in the proposition

Man is a sort

the term man has *simple* supposition; here it stands for the *species* of men rather than for individual men. The failure of transitivity in the above inferences can then be accounted for by observing that a shift in supposition occurs in the premises: in one the supposition of *man* is formal whereas in the other it is simple, and so the inference is barred.

The theory of consequence in medieval logic, of course, treats of the Aristotelian theory of the syllogism, that is the theory of inference among categorical judgments. Such judgments have the S is P form, but they are not just simple predications such as [Sortes is (a) man]. The copula can vary both in quality and quantity. An affirmative judgment has the form [S is P] and a negative one has the form [S is not P], whereas a universal judgment has the form [all S are P] and a particular one has the form [some S are P]. Thus, for instance, a particular negative judgment takes the form [some S are not P]. Medieval logic summarized the basic inferential properties between such cate-

gorical judgments in the Aristotelian *square of opposition*. In *An. Pr.* Aristotle had organized the syllogism according to three 'figures' (subsequently also a fourth figure was considered by Galen) and determined the 'valid syllogistic modes' by means of reducing the valid modes in later figures to the 'perfect' syllogisms in the first mode. The well-known mnemonic descriptions '*Barbara, Darii, Celarent,* etc.' of the valid modes of inference were given in the Middle Ages; these descriptions provide codes for the reduction of the validity of modes in the later figures to the primitive validity of the perfect modes in the first figure. Decent expositions can be found in any number of texts on traditional logic.

As is well-known, the Aristotelian theory validates inferences that are not held to be valid in current logic. First among these is the instantiation of universal judgments:

All swans are white. *Therefore*: there is a white swan.

Aristotelian terms were reached by *epagogé* (Aristotelian induction). You grasp the concept *swan* by seeing an instance thereof, which particular exemplar serves as an *exempla gratia* for the sort in question. Thus the inference is valid and the universal categorical judgments carry 'existential import.' Today, within current predicate logic the example would be regimented as

$\forall x(Swan(x) \supset White(x))$. *Therefore*: $\exists x(Swan(x)$ & $White(x))$

which inference is not valid. Only the step to the conclusion

$\exists x(Swan(x) \supset White(x))$

is valid. This, however, is not a regimentation of 'there is a white swan,' but only of 'there is something which is such that if it is a swan then it is white,' and this claim, given the premise that everything is such that if it is swan then it is white, is completely trivial as long as the universe of discourse is not empty: *any* object is such an object. The inference from an affirmative universal proposition to an affirmative particular one is an example of 'alternation.' Other similar kinds of inference concern 'descent' from the universal judgments to a conjunctive one:

All men are mortal. *Therefore*: Peter is mortal and John is mortal.

(Of course, there is no need to limit ourselves to just two conjuncts here. *Mutatis mutandis* this remark applies also to the examples given in the sequel.) Similarly,

Some men are mortal. *Therefore*: Peter is mortal or John is mortal.

is a descent to a disjunctive proposition. One can also descend with respect to *terms*:

All men are mortal. *Therefore*: John and Simon are mortal.

Aristotelian logic, when cast in the mold of traditional syllogistic theory, is a *term-logic*, rather than a logic of propositions. The medievals liberated themselves from the term-logical straitjacket of the Aristotelian syllogistics, first by considering also

syllogisms with *singular* judgments, that is, categorical [S is P] propositions of the form [s is P], where s is a *singular term*. Here the so-called *expository syllogism* played an important role:

This thing (*hoc*) is a man, but this thing runs. *Therefore*: A man runs.

However, gradually also other forms of inference than term-logical syllogisms were studied by medieval logicians, including the pure and mixed *hypothetical* syllogisms. A pure hypothetical syllogism takes the form

If P then Q and if Q, then R. *Therefore*: If P, then R.

The mixed forms of the hypothetical syllogism include the well-known *modus (ponendo) ponens* inference:

If P, then Q, but P. *Therefore Q*.

Here we have left the term-logic of syllogistic theory; the connections are here not between terms, but between propositions. This shift in perspective led, (± 1 300) to the appearance of a new logical genre. Then tracts bearing the title *On Consequence* begin to appear, and consequence becomes the main topic of study in medieval logic.

In such tracts rules for the holding of consequences were set out. Today, in elementary logic classes, when the analysis of natural language arguments is treated, students are taught to search for argument indicator words, such as 'thus,' 'therefore,' 'hence,' 'whence,' 'because,' etc. However, today we also make a clear distinction between implication, consequence, inference and causal grounding:

- 'implies' is an indicator-word for *implication*, which is a propositional connection between proposition(al content)s.
- 'follows from,' 'is a consequence of' and 'if . . . is true, then – is true' are indicator-phrases for *consequence*, which is a relation between proposition(al content)s.
- 'thus,' 'therefore' are indicator words for *inference*, which is a passage from premise judgment[s] (assertion[s]) to a conclusion judgment (assertion).
- 'because,' 'is a cause (ground, reason) for' are indicator words for *causal grounding*, which is a relation between events, or states of affairs.

However, in medieval logic, *si* (if), *igitur* (therefore), *sequitur* (follows) and *quia* (because) are all indicator-words for one and the same notion of a *consequentia*. This notion survives terminologically in modern logic under two different guises, namely, on the one hand, as the notion of *(logical) consequence* between WFFs that derive from Bolzano's *Ableitbarkeit* and that was made famous by Tarski, and, on the other hand, as the *sequents* (German *Sequenzen*) that were used by Gentzen. The medieval theory of consequences, accordingly, can rightly be seen as a partial anticipation of contemporary sequent-calculus renderings of logical systems. The modern notion of logical consequence has its medieval counterpart in the notion of a *formal* consequence, that is, one that holds 'in all terms,' for instance:

All men are mortal. Sortes is a man. *Therefore*: Sortes is mortal.

This consequence remains valid under all (uniform) substitutions (*salva congruitate*) of other terms put in place of *Sortes, mortal,* and *man.* Formal consequence is opposed to *material* consequence, for instance the consequence

Sortes is a man. *Therefore*: Sortes is mortal.

holds only materially, since it does not hold 'in all terms.' Material consequence can be compared to (Carnap's contemporary notion of) 'meaning postulates.'

Another very interesting, late addition to medieval logic is the theory of *obligations*, which is concerned with the proper rules for disputation and questioning. Thus, for instance, if I have asserted a conjunctive proposition, I have incurred an obligation and might be held to be asserting each conjunct separately. This theory lies on the border-line between logic, semantics, and pragmatics, incorporating also elements of the theory of speech acts. To an amazing extent, it constitutes an anticipation of the current *dialogical* approach to logic and semantics that was designed by Lorenzen and Lorenz, or the *game-theoretical semantics* that we owe to Hintikka.

In contemporary philosophical logic, logical paradoxes and their resolution – their diagnosis and prevention – are treated if and when they arise. Their treatment does not constitute a separate branch of logic. In (late) medieval logic, however, a novel genre was added to the standard logical repertoire and tracts devoted solely to the treatment of *Insolubilia* begin to appear.

Not all of medieval logic is confined to logic texts, though. The role that philosophy served in medieval academic life was primarily that of an *ancilla theologicae* ('a servant of theology'). Therefore, one can often find passages that are highly relevant from a logico-semantical point of view also outside tracts that are devoted specifically to matters logical. In particular, treatments of delicate theological questions, for instance, in the *Commentaries* on Peter Lombard's *Sentences* (that is, the obligatory introductory compendium to the study of theology), often contain material that is highly illuminat-ing from a logical point of view. The vexing questions concerning the nature of the Trinity and the interrelations of Its Persons illustrate this sufficiently. Two other topics that stand out in this respect are the question whether God's existence can be demon-strated and the treatments of the various Names of God. Thomas Aquinas does not enjoy a high reputation as a logician; his fame rests on his contribution to metaphysics and the philosophy of mind. Nevertheless, his *Summa Theologica* contains much that is of great relevance for contemporary philosophy of logic and language. Thus, for instance, in his discussion of the Names of God in Question 13 Aquinas anticipates Frege's ideas concerning names with different modes of presentation of the same object.

Furthermore, concerning the demonstrability of God's existence we read:

A proposition is *per se nota* because the predicate is included in the nature of the subject: for instance, *Man is (an) animal,* for *animal* is contained in the nature of *man.* (*Summa Theologica,* I.ii.)

This passage ought to yield a *déjà lu* experience. Most of us, certainly, will have read this explanation of a proposition *per se nota.* The German text from which we know it is not

medieval, but was published 500 years later. in 1781, by a professor of philosophy at Königsberg in Eastern Prussia. There, though, the same formulation is used to explain the notion of an *analytic judgment.*

A Timeline of Medieval Logicians

Before XI
Porphyry (232–305)
Augustinus (354–430)
Boethius (480–524)

XI
Abbo of Fleury
Garlandus Compotista
Anselm of Canterbury (d.1109)

XII
Peter Abailard, 1079–1142
Adam Parvipontanus
Gilbert of Poitiers, 1080–1154
Alberic van Reims
John of Salisbury, c. 1120–1180

XIII
Peter of Spain (d.1277)
William of Sherwood (1210?–66/70)
Robert Kilwardby (d. 1279)
Albert the Great (1200–80)
Roger Bacon (1215–94)

XIII (*cont.*)
Boethius of Dacia (c. 1270)
Henry of Ghent (c. 1217–93)
Ralph Brito (c. 1290–1330)
Siger of Kortrijk (d. 1341)
Simon of Faversham (c. 1300)
John Duns Scotus (1265–1308/9)

XIV
Walter Burleigh (c.1275–1344/5)
William of Ockham (1285–1347)
Robert Holkot (c.1290–1349)
William of Heytesbury (d.1272/3)
Gregory of Rimini (c.1300–1358)
John Buridan (c.1300–after 1358)
Nicholas of Autrecourt (c.1300–after 1358)
Richard Billingham, (c.1350–60)
Albert of Saxony (1316–1390)
Marsilius of Inghen (c.1340–1396)
Vincent Ferrer (c.1350–1420)
Peter of Ailly (1350–1420/1)
Paul of Venice (1369–1429)
Paul of Pergola (1380–1455)
Peter of Mantua (d. 1400)

A Guide to the Literature

The Aristotelian *Organon* is, of course, a prerequisite for medieval logic. G. Patzig, *Aristotle's Theory of the Syllogism* (First German edn 1959) English translation by J. Barnes (Reidel: Dordrecht, 1969) is still the classical treatment of Aristotle's theory, and Paul Thom, *The Syllogism* (Munich: Philosophia Verlag, 1981) offers a most thorough modern presentation. A. N. Prior's lemma "Logic, Traditional" in: Paul Edwards (ed.), *Encyclopaedia of Philosophy* (New York: Macmillan, 1967) gives a compact, yet lucid overview. H. W. Joseph and R. D. McKirahan, *Principles and Proofs* (Princeton University Press, 1992) treats of Aristotelian demonstrative science, a topic of paramount importance for medieval logic. Valuable surveys of medieval logic can be found in the general histories by W. Kneale and M. Kneale, *The Development of Logic* (Oxford: Clarendon, 1962) and I. M. Bochenski, *Formale Logik*, English tr. by Ivo Thomas: *A*

History of Formal Logic (Notre Dame University Press, 1963). Surveys of medieval logic have been offered by E. A. Moody, *Truth and Consequence in Medieval Logic* (Amsterdam: North-Holland, 1953), Norman Kretzmann, "Semantics, History of" in: Paul Edwards (ed.), *Encyclopaedia of Philosophy* (New York: Macmillan, 1967), Jan Pinborg, *Logik and Semantik im Mittelalter* (Stuttgart-Bad Cannstatt: Fromann-Holzboog, 1972). Of these we have found the trenchant studies of Pinborg and Kretzmann especially useful. Moody draws liberally upon the notations and conceptual resources of modern (Frege–Russellian) predicate logic for his exposition of medieval notions, but the extent of his success in doing so is doubtful, owing to the differences in the forms of judgments used: medieval logic used the form of judgment (S is P) whereas (post-)Fregean logic uses the form of judgment (the judgable content A is true). It is still very much an open question how best to utilize the insights and achievements of modern metamathematical logic (which builds on Fregean logic) for the study of medieval logic in a non-anachronistic way. The systems of Lesniewski are based on traditional rather than Fregean logic, and might work much better here. A standard reference is D. P. Henry's lucid *Medieval Logic and Metaphysics* (London: Hutchinson, 1972) that also serves as an admirable introduction to Lesniewski.

The German *Historisches Wörterbuch der Philosophie* gives an incomparable survey of medieval logic. Individual, detailed lemmas, for instance, those on "Prädikation" and "Logik" have been of great help to us. This dictionary is also an invaluable guide, not just to medieval logic, but to the entire conceptual development of logic.

The Cambridge History of Later Medieval Philosophy, eds. N. Kretzmann, J. Pinborg, and A. Kenny (Cambridge University Press, 1982) is a universal compendium of medieval logic, with a companion volume of original texts *The Cambridge Translations of Medieval Philosophical Texts*: vol. I, *Logic and the Philosophy of Language*, eds. N. Kretzmann and E. Stumpf (Cambridge University Press, 1988). The equally monumental *Logica Modernorum*, vol. II (two parts), (Assen: Van Gorcum, 1967) by L. M. de Rijk, contains the original sources for the theory of supposition and other basic properties of terms.

Among original works we have found the William of Sherwood's thirteenth-century textbook *Introduction to Logic* (English translation by Norman Kretzmann), (Minneapolis: University of Minnesota Press, 1966) a useful general introduction to most issues covered in the present chapter. A later treatment, by almost a century and a half (±1400), of roughly the same material is offered by Paul of Venice in the *Logica Parva* (ed. and tr. by A. Perreiah), Philosophia Verlag (Washington: Catholic University of America Press, 1984). The British Academy supports a multi-volume edition/translation of the magisterial *Logica Magna* by the same Paul of Venice. William of Ockham's *Summa Logicae* has been partly rendered into English: part I (tr. M. Loux) and part II (tr. A. Freddoso and H. Schurmann) (Notre Dame University Press, 1974, 1980). Furthermore, the series *Philosophisches Bibliothek*, published by Felix Meiner Verlag, (Hamburg, contains many bilingual (Latin/German) editions, with introductions and careful annotations, of important works in medieval logic.

The Routledge series *Topics in Medieval Philosophy* contains volumes of interest for the general philosopher: Ivan Boh, *Epistemic Logic in the Later Middle Ages* (London, 1993) is particularly interesting on the epistemological aspects of the theory of consequences, while A. Kenny, *Aquinas on Mind* (London, 1993) spells out interesting par-

allels between medieval conceptions and those of Wittgenstein. Simo Knuuttila, *Modalities in Medieval Philosophy* (London, 1993) contains much that is of interest for the modern theory of modality, as does John Duns Scotus, *Contingency and Freedom: Lectura I 39* (ed. and tr. by A. Vos Jaczn. et al.), *New Synthese Historical Library*, vol. 42 (Dordrecht: Kluwer, 1994). Mikko Yrjönsauuri's Helsinki dissertation *Obligationes – 14th Century Logic of Disputational Duties*, in: *Acta Philosopphica Fennica*, 55 (1994), summarizes much of what is known about the theory of obligations. G. E. Hughes, *John Buridan on Self-Reference* (Cambridge University Press, 1982) is a perfect example of a medieval treatment of logical paradoxes.

There are two (English language) journals devoted to medieval philosophy, namely *Vivarium* and *Medieval Philosophy and Theology*. Of these, the first has a long tradition of articles within medieval logic and semantics. The *History and Philosophy of Logic*, *The Journal of Philosophical Logic*, and *The Notre Dame Journal of Formal Logic* also publish articles on medieval logic.

3

The Rise of Modern Logic

ROLF GEORGE AND JAMES VAN EVRA

The history of some sciences can be represented as a single progression, with each dominant theory coming to the fore, then eventually falling, replaced by another in succession through the centuries. The development of physics, for instance, can be understood as such a chain, connecting Newton in the seventeenth century with Einstein in the twentieth. Logic did not progress in this way; no dominant theory commanded it (a tapestry more than a chain) until the first decades of the twentieth century. No self-sustaining internal theory held sway before then, nor was there much rigor externally imposed. Even Aristotle, as one commentator put it, was more venerated than read, and most versions of syllogistic logic proposed after the Middle Ages did not measure up to the sophistication of his own system.

1   The Dark Ages of Logic

In 1543 the French humanist and logician Peter Ramus (1515–72), who had made a name for himself with his dissertation *Whatever Aristotle Has Said is False*, published his *Dialectic*, a slim book that went through 262 editions in several countries and became a model for many other textbooks. Ramus gratified the taste of the times by writing an elegant Latin, drawing his examples from Cicero and other classical authors, and by neglecting most of the finer points of medieval logic and the associated 'barbarous' technical vocabulary. The book was committed not to logic as we now know it, but to the art of exposition and disputation. Its first sentence, in an early English translation, reads "Dialecticke otherwise called Logicke, is an arte which teachethe to dispute well." In the next centuries, logic as the art of rhetoric and disputation, became the domain of textbook writers and schoolteachers, a prerequisite for careers in law or the church. The major authors of modern philosophy and literature did not advance or even concern themselves with logic so conceived, and generally treated it with derision. John Milton thought it a subject in which "young Novices . . . [are] mockt and deluded . . . with ragged Notions and Babblements, while they expected worthy and delightful knowledge" (*On Education*).

This was an age also of discovery in the sciences and mathematics. The textbook logic 'of the schools' played no role in this. Francis Bacon claimed in the *Novum*