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*Modal and Tense Analysis in Medieval Logic**

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In modern research into modal logic, modal terms are usually semantically interpreted in terms of the model of possible worlds:

- necessary (N) = df true in all possible worlds
- impossible ($\sim M$) = df false in all possible worlds
- possible (M) = df true in at least one possible world
- contingent (K) = df true in at least one possible world and
false in at least one possible world.

Now philosophers have thought about modal terms, modal propositions and modal syllogisms long before the notion of possible worlds was entertained. The question what interpretative model they used is a relevant one today. Jaako Hintikka and the circle of pupils and colleagues connected with him, in particular Simo Knuuttila, have tried to answer this question. They advance the following thesis¹: underlying the modal analysis proposed by Aristotle and the scholastic

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¹ This thesis was first advanced by Jaako Hintikka in 1957, and then in a series of further papers which were collected in 1973 in the volume *Time and Necessity, Studies in Aristotle's Theory of Modality* (Oxford). (In what follows I shall refer to this volume as 'Hintikka'). The same line of interpretation was followed in *Aristotle on Modality and Determinism* in: *Acta Philosophica Fennica*, 29, 1 (Amsterdam 1977) by Jaako Hintikka, Unto Remes and Simo Knuuttila. (This I shall refer to as 'Hintikka—Remes—Knuuttila'). Hintikka's pupil and colleague, Knuuttila, has in a work edited in 1981 (*Reforging the Great Chain of Being*, Dordrecht) tried to show that the scholastics until the end of the 13th century almost all took this view of time and modality; vid. *Time and Modality in Scholasticism*, *op. cit.* 163-257 (referred to in the following as 'Knuuttila').

writers there appears, at least in central sources², a model of modality in which the modal terms are semantically interpreted like this:

- N = df always the case (or: always true)
- ~M = df never the case (or: always false)
- M = df sometimes the case (or: sometimes true)
- K = df sometimes the case and sometimes not the case (or: sometimes true and sometimes false).

According to this, the modal terms are interpreted by reference to periods of time in the history of this one real world. In contrast to the semantics of possible worlds, this interpretation would be reductionist. In the reference to alternative worlds the modal term 'possible' reappears; it counts as an irreducible basic term, and the definitions only set out the relations of the other modal terms to the notion of possibility. Against this, when reference is made to time periods in this one actual world the modal terms are removed from the *definiens*. Thus in this theory "modal notions are in the last analysis reducible to extensional terms"³.

A reductionist theory of quantification over time periods is not, strictly speaking, a modal theory at all. Anyone systematically interested in modal logic and analysis could therefore, if Hintikka and Knuuttila were right, leave Aristotle and the scholastics unread; according to them these writers offer only attempts to abandon the problem of modalities altogether.

I dispute the correctness of the thesis which Hintikka and Knuuttila advance. In my opinion we can learn a great deal about the problems of modality from Aristotle, Boethius and in particular Peter Abelard, William of Shyreswood and Thomas Aquinas. The scholastics' analyses pertain to the question what is meant when, in both everyday and scientific language, we describe something as in the real sense possible, impossible, necessary or contingent⁴. One of their main themes is precise reflection on the difference between intensional and

² At various points the authors remark that this was not the only model propounded by Aristotle and the scholastics; cf. Hintikka—Remes—Knuuttila 14; Knuuttila 165, 199, 203. These remarks are however of a marginal nature, and the central significance of the statistical paradigm is repeatedly emphasised.

³ Knuuttila 235; cf. VII-IX and passim; Hintikka 113 and passim; Hintikka—Remes—Knuuttila 13 and passim.

⁴ Vid. my article, *Möglichkeit*, in: *Handbuch philosophischer Grundbegriffe*, ed. Hermann Krings, Hans-Michael Baumgartner and Christoph Wild (Munich 1973), 930-947.

extensional language and on the relationship between these manners of speaking⁵.

In the first part of the following investigation I shall present the thesis put forward by Hintikka and Knuuttila, and my objections to it⁶. In the second part I shall expand my criticisms by offering a counterinterpretation. I shall take up the topic on which the authors mentioned above have worked—the relationship between tense and modal qualifiers in statements about events—and shall put forward my own interpretation of the scholastic analyses. This I shall do in the form of a systematising reconstruction in which my concern will be to indicate basic features, not to differentiate the contributions and positions of individual philosophers in a manner which is historically exact at every point.

I. The “Statistical” Interpretation of Modal Terms—an Account of the Thesis, and Objections to it

1. The Point of Departure: the “Principle of Plenitude”

Arthur Oncken Lovejoy’s *The Great Chain of Being*⁷, appeared in 1936 and was reprinted in 1950. According to Lovejoy, there is one basic assumption at the root of the thinking of many of the philosophers in the Western tradition. This can be termed the ‘principle of plenitude’, according to which nothing which is possible in this world can remain unrealised⁸. In that part of his investigation which concerns the early history of this thought, Lovejoy puts forward the view that the principle of plenitude was accepted by Plato, but not by Aristotle. At this point Hintikka emphatically contradicts him.

⁵ Vid. my monograph, *Die Modalbegriffe in den logischen Schriften des Wilhelm von Shyreswood und in anderen Kompendien des 12. und 13. Jahrhunderts. Funktionsbestimmung und Gebrauch in der logischen Analyse (Studien und Texte zur Geistesgeschichte des Mittelalters)*, ed. Albert Zimmerman; vol. XIII, Leiden-Cologne 1980), esp. section X, 337-355.

⁶ On Hintikka’s interpretation of Aristotle’s modal theory cf. M. M. Mulhern, *Aristotle on Universality and Necessity*, in: *Logique et Analyse*, 12 (1969) 288-299; Martha Kneale’s review of *Time and Necessity*, in: *Philosophical Quarterly*, 24 (1974) 367-370; Jonathan Barnes’s review of *Time and Necessity*, in: *Journal of Hellenic Studies*, 97 (1977) 183-186; Richard Sorabji, *Necessity, Cause and Blame, Perspectives on Aristotle’s Theory* (Ithaca, New York 1980), vid. index on Hintikka; R. T. McClelland, *Time and Modality in Aristotle, Metaphysics IX 3-4*, in: *Archiv für Geschichte der Philosophie*, 63, 2 (1981) 130-149.

⁷ A. O. Lovejoy, *The Great Chain of Being; A Study of the History of an Idea* (The William James Lectures delivered at Harvard University 1933, 1936, 2nd edn. 1950).

⁸ Cf. Lovejoy (op. cit.) 52; vid. index on *Plenitude, principle of*; Hintikka 94-96; Knuuttila 163.

Hintikka's and Knuuttila's research into Aristotle's modal theory and the scholastic work connected with it starts from the claim that Aristotle himself consciously presupposes this principle⁹.

It is indisputable that Aristotle does not define the modal terms by reference to a totality of possible worlds; for him, what is possible is possible in this real world. Given this, it is the second set of definitions of the modal terms at the beginning of this paper, to which Hintikka and Knuuttila refer as the 'statistical model of modality'¹⁰, which explicate the "principle of plenitude". More exactly, as Hintikka remarks¹¹, the theses

'What is never the case is impossible'

'What is always the case is necessary'

as well as

'What is possible is sometimes the case'

'What is not necessary is sometimes not the case'

are based on the "principle of plenitude"; whereas the opposite implications

'What is impossible is never the case'

'What is necessary is always the case'

'What is sometimes the case is possible'

'What is sometimes not the case is not necessary'

are valid independently of this principle.

Can Hintikka and Knuuttila prove that Aristotle and the scholastics until the end of the 13th century accept the "principle of plenitude"? Hintikka can show that Lovejoy brings no conclusive proof to the contrary. The sources cited by Lovejoy¹² allow not only of the interpretations 'Some possibilities' or 'Every possibility can remain *for ever* unrealised', but also—and more plausibly—"Some possibilities" or

⁹ Hintikka 95; Knuuttila X. Cf. too the indices on *Principle of Plenitude*.

¹⁰ Hintikka 103. Cf. in the index: *Necessity, statistical concept of; — and omnitemporality; — and the principle of plenitude; Possibility, always realized in the long run; — realization of; — realized in time; — statistical concept of; — and the principle of plenitude; Contingency, and the principle of plenitude*. Knuuttila does not speak only of a statistical model or paradigm, but also of the statistical theory of modality: e.g. X, 235.

¹¹ Hintikka 96f.; cf. Hintikka—Remes—Knuuttila 21.

¹² Aristotle, *Metaph.* Beta 6, 1003a 2; Lambda 6, 1071 b 13-14; cf. Lovejoy (op. cit.) 55.

'Every possibility can *sometimes* remain unrealised'¹³. Thus interpreted, the sources are compatible with the principle of plenitude. However, Hintikka's attempt to press these sentences further, so that they confirm the validity of the principle, 'Every sheer possibility (contingency) *will in fact* be realised at some time'¹⁴, is at least as forcible as Lovejoy's attempt to claim them for the contrary thesis.

According to Hintikka¹⁵ and Knuuttila¹⁶, it is possible to claim with regard to a passage in *Metaph.* Theta that

"This passage clearly shows how the assumption that each genuine possibility is realized at some moment of time was one of the presuppositions of Aristotle's thinking"¹⁷.

The passage runs:

"ouk endechetai alêthês einai to eipein hoti dunaton men todi,
ouk estai de. hôste ta adunata einai tautê diapheugein"

"It is not possible that it can be true to say, 'This is possible, but will never be the case;' this would be to rule out impossibility"¹⁸.

¹³ Hintikka 97.

¹⁴ Ibid.

¹⁵ Hintikka 107f.; cf. the other references in the index.

¹⁶ Knuuttila 166.

¹⁷ Ibid.

¹⁸ Aristotle, *Metaph.* Theta 4, 1047 b 4-6. The English translation, on which Hintikka and Knuuttila base their remarks, runs: "It cannot be true to say that 'this is possible but will not be', which would imply the disappearance of impossible things". R. T. McClelland (see n. 6) has recently examined this passage, relating it to Aristotle's discussions in *Metaph.* Theta 3-4. He reaches the conclusion that Aristotle does not accept the 'principle of plenitude' (146, 147). He translates the passage in question, like G.E.L. Owen and Martha Kneale before him, as follows: "It cannot be true to say that this is possible but will not happen and to say this to such effect that the existence of the impossible will escape us in this way" (132, 146). McClelland paraphrases this in order to make Aristotle's argumentative intention clearer: "If 'the possible' is as we have described it—or, is derivable from what we have said—, it is clearly the case that it cannot be true to say of any given thing 'this is now capable of happening but it never will happen', intending by such means to make of 'the impossible' an empty locution of which there are no instances" (146). Cf. Sorabji (see n. 6) 136: "Kneale and Owen suggest that Aristotle is not objecting to a denial of the principle of plenitude, but only to a certain moral misguidedly drawn from the denial. The mistaken moral is that what never happens is *in every case* possible. ...As S. Mansion points out (*Le Jugement d'Existence chez Aristote*, 2e éd., Louvain 1976, n. 13), if the passage is interpreted in this way, it actually goes against the ascription to Aristotle of the principle of plenitude. For in resisting the idea that *all* things which fail to happen are possible, Aristotle will be allowing that *some* things which never happen are none the less possible". The interpretation of the passage concerned given by Thomas Aquinas, *In Metaph.* L.IX, 1.III, n. 1807, very largely agrees with this.

Hintikka and Knuuttila clearly read this sentence as a statement about the inconsistency of a particular combination of truth-values: 'The proposition, "Something is possible and will never be the case", cannot be true'; this can be formalised as ' $\sim M(Mp \& \sim \exists t(p \rightarrow t))$ '. Read in this way, the sentence really does presuppose the principle of plenitude; it allows of the equivalent reformulation, 'The proposition, "If something is possible, it is sometimes the case"', is necessarily true'—formalised as ' $N(Mp \rightarrow \exists t(p \rightarrow t))$ '. However, I suggest another interpretation. According to my reading, the sentence quoted here has nothing to do with the contentious principle. Aristotle is not in the least concerned with the question whether the truth values of propositions representable by variables are compatible with each other. Rather, he is disputing the reliability of the following prognostication: 'This is possible, but will never be the case'. Anyone who advances claims about particular events must be prepared to justify these claims in argument. The prediction, 'This will never be the case', which covers the whole of future time, could be justified by, 'This is not possible'. And if anyone says about a particular event, 'This is possible', he ought to be in a position to advance reasons for which it might occur¹⁹. I agree with Hintikka when he writes of this passage²⁰, 'Aristotle ... warns us against assuming that something is possible but will never be'. But I dispute the contention that this means the same as, 'Aristotle tells us that whatever is possible will be the case'.

In other cases too the apparent corroborative force of the sources cited by Hintikka and Knuuttila in support of their thesis disappears as soon as one investigates which question is actually being discussed in the text concerned. In answer to the question, '*What do we understand by "It is possible"?*' the reply, 'It is sometimes the case', is false. And none of the authors examined by Hintikka and Knuuttila does give this reply²¹. However, in answer to the quite different question '*On what is the claim based that this is possible?*' the reply 'Something of the sort is the case or has been the case, and it cannot be ruled out that it will occur again', is perfectly appropriate. We do not refer to what is

¹⁹ For a more exact account of this reflection, in which it is also shown that that which only exceptionally occurs is not a possible object of prediction, vid. my article, *Kontingente Naturgeschehnisse*, in: *Studia Mediewistyczne*, 18, 2 (1977) 3-70; esp. 21, 32.

²⁰ Hintikka 108.

²¹ Hintikka himself allows that Aristotle never defines the modal terms with reference to the principle of plenitude (102f.), but without drawing the consequences of this admission.

or has been the case in order to define 'possibility', but in order to justify substantive claims about particular possibilities. Corresponding observations apply to the other modal terms.

The connection between modal and tense qualifiers is not a matter of definition but one of *argumentation*. If someone says, 'This is possible', he has sufficiently supported his claim if he can show that states of affairs of the same type as that to which he is referring sometimes do occur. If he says, 'This is not necessary (= possibly not)' he has sufficiently supported his claim if he can show that states of affairs of the same type as that to which he is referring sometimes do not occur. Neither case presupposes implications such as 'If possible, then sometimes the case' ('Only when sometimes the case, then possible'), or 'If possible that not the case, then sometimes not the case' ('Only if sometimes not the case, then possible that not the case'). The argument takes place, rather, according to the schema, 'Because sometimes the case, therefore possible', or 'Because sometimes not the case, therefore possible that not the case'. Claims about the necessity or the impossibility of some state of affairs cannot be supported by reference to experiences nor to interpolations and extrapolations generalising about them. The argumentative relationship between statements containing modal and time qualifiers is reversed here. If someone says, 'This is always the case', he is claiming that his statement is valid for future time as well. He has adequately supported his claim if he can show that the state of affairs concerned belongs to a type to which necessity pertains. If he says, 'This is never the case', he has adequately supported his claim if he can show that the state of affairs concerned belongs to a type which is impossible in itself. Arguing in these ways, one does not presuppose implications such as, 'If always the case, then necessary' ('Only if necessary, then always the case'), or 'If never the case, then impossible' ('Only if impossible, then never the case'). The argument runs, rather, according to the schema 'Because necessary, therefore always the case', or 'Because impossible, therefore never the case'.

The theses which follow from the "principle of plenitude" do not occur in the schemata I have given. Both references to what is actually the case and time references are completely out of place when we wish to explicate what is meant by 'possible', 'contingent', 'impossible' and 'necessary'. Thomas Aquinas expressly refuses to *define*, as well as to differentiate, the modal terms by reference to what will be the case. Attempted definitions of this sort, he says, are "incompetent".

Modal terms should not be defined “*a posteriori*” and “externally”, but intensionally, by reference to that to which a thing “is determined by its nature”²². In order to explain why he attaches the term “*a posteriori*” to the suggested definitions, ‘That is impossible which will never be the case’, ‘That is possible (in the sense of “contingent”) which will sometimes be the case and sometimes not’, Thomas adds,

“For something is not necessary because it will always be the case; it will always be the case because it is necessary; and clearly the same applies to the other (attempted definitions)”²³.

Knuuttila has discussed this passage²⁴. According to him, if Thomas had followed his thought through to the end he would have had to say—correspondingly to what he has said about the concept of necessity—that something is not contingent because it will sometimes be the case and sometimes not; it will sometimes be the case and sometimes not because it is contingent. And this would be to give possibility as a sufficient reason for something’s being the case on occasion—that is, it would be to advance what the “principle of plenitude” advances. But it seems to me that Knuuttila is looking here in vain for corroboration for his own interpretation. Thomas argues as follows against the attempted definitions I have summarised: even *if* in all these definitions both sides *were* equivalent; if, that is, it were valid not only to say, ‘If impossible, then never the case’, but also ‘If never the case, then impossible’; not only, ‘If necessary, then always the case’, but also ‘If always the case, then necessary’; not only to make the conjunction of the transpositions for the first pair of implications, ‘If not never (= sometimes) and not always the case, then contingent’, but also ‘If contingent, then sometimes the case and sometimes not’; even this would be irrelevant to the definition of the modal terms. This passage will not do for testing which implications Thomas recognises between modal and tense statements. Thomas’s argumentative intention is precisely to expel references to what is actually the case—whether always or never or sometimes and sometimes not—from definitions of modal terms. As he often does elsewhere, here too Thomas makes all possible admissions to his opponents in order to bring the controversy to its decisive point:

²² Thomas Aquinas: *In Perih.* I..I, 1.XIV, n. 183; cf. my article mentioned in n. 19 above, 25f.

²³ Thomas Aquinas, loc. cit.

²⁴ Simo Knuuttila, *The Statistical Interpretation of Modality in Averroes and Thomas Aquinas*, in: *Ajatus*, 37 (1978) 79-98; here: 94.

definitions of modal terms may not be extensional and must be intensional. The statistical model of modality is, as a definitional model, useless.

The "better" definitions, which Boethius attributes to Philo²⁵ and which Thomas believes to coincide with Aristotle's view²⁶, run as follows: 'That is necessary which, by its nature, can only be'; 'That is impossible which, by its nature, can only not be'; 'That is contingent which, by its nature, is neither completely determined to be nor completely determined not to be'. Knuuttila cites similar definitions from the logical writings of Peter Abelard²⁷, and wonders whether definitions such as 'Whatever Nature admits of is possible' do not contradict his own view—according to which Abelard too interprets the modal terms statistically. Knuuttila tries to avoid this objection by pointing out that we can only know what Nature allows by abstracting from our knowledge of facts. But against this it can be said that the question what we mean by 'possible' must not be confused with another, a question concerning some state of affairs—namely, 'How do we know that this is possible'? The medieval authors correctly lay the greatest weight on keeping these distinct. In order to answer the second question, we do admittedly have to rely on abstract generalisations about experience. However, the semantic interpretations of the modal terms given by Abelard—like Thomas's later—emphatically avoid a reductionist, extensional account of their meaningful content²⁸.

Hintikka and Knuuttila refer to a large number of texts in which the philosophers they interpret purportedly assume the principle of plenitude. It is not possible here for me to provide individual examinations of all these references and the observations made upon them; I shall confine myself to formulating methodical objections.

²⁵ A. M. S. Boetii *In Librum Aristotelis De Interpretatione*, Ed. sec., L.III, Pl. 64, 510 D-511 B.

²⁶ Thomas Aquinas: *In Perih.* L.I, 1.XIV, n. 183.

²⁷ Knuuttila 181f. The last line of n. 41, which belongs to this, should be corrected: *Log. Ingrid.* 498, 33-35.

²⁸ The following argument is a further example of the confounding of semantic and epistemological standpoints. Knuuttila rightly points out (215) that according to Thomas Aquinas we can indeed know *that* there are unrealised possibilities, because God can do more than will ever be the case (cf. Knuuttila 198-207), but that *in statu viae* we can never know *which* these possibilities are. Knuuttila infers from this that for Thomas, in the context of philosophy, only that which is at some time actual is possible; his talk of God's possibilities is an idea "seldom used in his (Thomas') discussions of philosophical problems" (215). Again, this ignores the distinction between what we mean by 'possible' and how we can tell what is possible. For the first, which certainly is a philosophical question, recourse to God's possibilities is of decisive significance.

Hintikka and Knuuttila quote, paraphrase or name parts of texts, but only in exceptional cases²⁹ do they analyse whole patterns of argument. More usually they omit to consider the subject of debate in each of the contexts from which their excerpts are taken. There are, though, relevant differences between them. One of the formulations in which Hintikka perceives the principle of plenitude runs as follows: 'Nothing eternal is contingent'³⁰. This sentence is, in fact, Aristotle's³¹. But Hintikka appears to overlook the fact that Aristotle only uses the word '*aïdios*'—'eternal'—for events in the heavenly sphere; the sentence quoted here has no application to the sublunary world. It cannot be understood as a principle of tense or modal logic, but as a substantive principle of a specific science, that of celestial physics. The conversion of this sentence, 'Nothing contingent is eternal', can be taken as a valid rule in earthly physics insofar as its principles can basically only claim to apply to that which occurs as a rule³².

To summarise: there is no single text named by Hintikka or Knuuttila in which Aristotle or Abelard or Thomas directly support the principle of plenitude or expressly accept the "statistical" interpretation of modal terms. Where the semantic interpretation of modal terms is in question, it is, rather, continually emphasised that these terms are not reducible. In most of the texts quoted by Hintikka and Knuuttila it is claimed only that in our substantive speech about particular possibilities we remain bound to what can be experienced—that is, to what is at some time the case. This has nothing to do either with the principle of plenitude or with a statistical interpretation of modal terms. In the remaining references it might be investigated what is being discussed in the surrounding contexts, so as to discover under which conditions a reductionist interpretation of modal terms might be admissible.

2. The Problem: Logical Determinism

Hintikka³³ and Knuuttila³⁴ also advance as one place in which the principle of plenitude is applied the famous sentence from *De Int.* c.9³⁵:

²⁹ There are two of these exceptions. One is Hintikka's interpretation of Aristotle's *De Int.* c. 9; the other is Knuuttila's paraphrase of Duns Scotus's *De Primo Principio* IV, 4, 3. Proof.

³⁰ Hintikka 96.

³¹ Cf. Hintikka 104.

³² Cf. Sorabji (see n. 6) 60, 128-132; also my article mentioned in n. 19.

³³ Hintikka 151f.; Hintikka — Remes — Knuuttila 44.

³⁴ Knuuttila 166, 235; cf. 170f., 181, 183.

³⁵ Aristotle, *De Int.* 9, 19a 23-24. In J. I. Ackrill's translation (*Aristotle's Categories and*

“to men oun einai to on hotan ē, kai to mē on mē einai hotan mē ē, anagkē”—“Necessarily, what is, is, when it is; and what is not, is not, when it is not”. This sentence can be regarded as following from the principle in question only on condition that it is postulated that it is valid not only for types of event, but also for individual ones.³⁶ I consider it quite improbable that Aristotle accepts the principle in this extreme form³⁷. He would, if he did so, have to admit that it applied also to events distinguished not by dating but by qualifiers of quality, place or position.

I shall make clear later how I understand the contentious sentence; first I shall continue to examine the steps taken by Hintikka and Knuuttila. The sentence, as they understand it, is a deterministic one:

“Hence all statements about events that are individual in the sense of being tied to a particular moment of time, will be either necessarily true or necessarily false”³⁸.

According to these authors, Aristotle believed, though, that he could render this determinism harmless by emphasising the difference between ‘necessary that p at time t₀’ and ‘necessary that p’.

De Interpretatione, Oxford 1963), the sentence is rendered, ‘What is, necessarily is, when it is; and what is not, necessarily is not, when it is not’. Hintikka quotes this translation, but with slightly altered punctuation: ‘What is necessarily is, when it is; and what is not necessarily is not, when it is not’ (156). In Hintikka — Remes — Knuuttila the punctuation is as follows: ‘What is, necessarily is when it is; and what is not, necessarily is not when it is not’ (44).

³⁶ A formal proof, which Hintikka and Knuuttila do not provide but instead replace with formulations such as ‘seems to follow’ (Knuuttila 166), could be given as follows: Given:

$$M p \rightarrow \exists t (p-t).$$

This assumption can, according to the laws of modal and predicate logic, be transformed into the equivalent

$$\forall t (p-t) \rightarrow N p.$$

Application: $M (p-t_i) \rightarrow (p-t_i).$

By counterposition and transformation, valid in modal logic, this yields:

$$\sim (p-t_i) \rightarrow N \sim (p-t_i).$$

From this, by substituting $p-t_i / \sim (p-t_i)$:

$$(p-t_i) \rightarrow N (p-t_i).$$

³⁷ Hintikka claims (160) that Aristotle expressly presupposes the axiom ‘possibility equals sometime truth’ in *De Int.* 9, and as proof of this he quotes the sentence, “horōmen gar...hoti holōs estin en tois mē aei energousi to dunaton einai kai mē” — “We see that...in things that are not always actual there is the possibility of being and not being” (19 a 9-11). This argument is faulty. In ‘What is not always actual is contingent’ the principle of plenitude is, as Hintikka himself remarks elsewhere (96f.), not implied. ‘ $\sim \forall t (p-t) \rightarrow \sim N p$ ’ can be transformed, according to the laws of propositional and modal logic and by substituting $p-t / \sim (p-t)$, into the equivalent ‘ $\exists t (p-t) \rightarrow M p$ ’; but only ‘ $\exists t (p-t) \rightarrow M p$ ’ is dependent on Hintikka’s postulated principle.

³⁸ Hintikka 151f.; cf. 161, 174; Hintikka — Remes — Knuuttila 31-58 and passim; Knuuttila 166 and passim.

“Aristotle tries to avoid deterministic conclusions by shifting the focus of his attention from statements of type (3) (= p at time t_0) to temporally unqualified statements³⁹”

—namely those of the type ‘ p *simpliciter*’ or ‘ p now’. The individual event is not regarded as individual, but seen in relationship with similar occurrences. But it is not postulated of this class of occurrences that they are either necessarily true or necessarily false⁴⁰.

Knuuttila claims to discover the same attempt to solve this problem in the work of Boethius⁴¹, Abelard⁴², Lambert of Auxerre⁴³ and Thomas Aquinas⁴⁴. He emphasises that it is merely an apparent solution:

“The generalization with respect to time leaves fully untouched the deterministic implications of Aristotle’s assumptions concerning temporally determined events and sentences”⁴⁵.

Knuuttila presents Duns Scotus’s new modal theory as “Duns Scotus’ Criticism of the Statistical Interpretation of Modality”⁴⁶. Here I agree with Knuuttila’s account at important points. Duns Scotus develops the basic traits of a theory of possible worlds, and indeed does so in the course of critical comments on the claims of his predecessors. But I do not believe that this argument proceeds exactly as Knuuttila describes. It seems to me that it is not his presentation of Duns Scotus’s position which is mistaken, but rather his view of that from which Scotus distances himself. I cannot set out here the points which I do believe Duns Scotus to attack—I shall make some remarks on this at the end of this paper. At present I shall content myself with drawing attention to the following. Duns Scotus quotes the Aristotelian sentence from *De Interpretatione*. This sentence, ‘*Omne quod est quando est, est necessarium*’, is susceptible of two interpretations. Taken *secundum divisionem*, it appears as a conditional sentence, whose sense Knuuttila correctly construes as “Whenever something is, it then necessarily is”. Taken thus, the sentence is false. Interpreted *secundum compositionem*, it is a categorical sentence, construed correctly by Knuuttila,

³⁹ Hintikka 161 in connection with 151; cf. 160; Hintikka — Remes — Knuuttila 44f.; Knuuttila 167, 235.

⁴⁰ Hintikka 170f.

⁴¹ Knuuttila 171.

⁴² Knuuttila 181, 184.

⁴³ Knuuttila 192.

⁴⁴ Knuuttila 210f.

⁴⁵ Knuuttila 167; cf. 221, 235f.; Hintikka — Remes — Knuuttila 45, 46.

⁴⁶ Knuuttila 217-234; cf. 236f.

when he puts it, "Necessarily everything is when it is". Interpreted thus, the sentence is true⁴⁷. There is, therefore, an interpretation of this disputed, purportedly deterministic sentence, according to which the sentence has no deterministic implications and is perfectly true. And nor is this interpretation connected with the theory of possible worlds. How should it be? If the generalisation to what can take place at other times in this world supplies no real avoidance of logical determinism, then neither does the generalisation to what can happen at the same time in different worlds. Now Duns Scotus does not succeed in giving this sentence a true sense, free of determinism, by virtue of a new semantic theory; he does so by means of a simple syntactic distinction. This, the distinction between readings *secundum compositionem* and *secundum divisionem*, stems from Aristotle⁴⁸, and is an instrument familiar to Boethius and the scholastics⁴⁹. Might it not be plausible to claim that Aristotle himself and his interpreters before Duns Scotus also intended this sentence to bear the construction according to which it is true? And equally plausible to claim that it never was deduced from any such postulated presupposition as the "principle of plenitude"?

II. *On the Logic of Tense and Modal Qualifiers in Scholastic Writings: A Systematising Reconstruction*

1. The theses advanced by Hintikka and Knuuttila refer to 'occasion sentences'⁵⁰. In what follows, I shall explain how I understand the scholastic analyses relevant to this type of sentence. I shall recur only occasionally to other types of sentence and scholastic accounts of them; when I do mention these, it will be with the intention of marking the distinction between them and the type of sentence central to the discussion. In scholastic works, the standard example for statements about particular events is the sentence, '*Socrates sedet*'—'Socrates is sitting'. Here 'Socrates' does not refer to the historical Socrates, but to any arbitrarily selected individual, thought of as existing at the present time. For the sake of simplicity I shall use the same standard example.

2. Sentences about particular events are analysed in terms of propositional and of assertoric elements. The thought expressed in the

⁴⁷ Knuuttila 229.

⁴⁸ Cf. Hintikka — Remes — Knuuttila 48-50; Knuuttila 168.

⁴⁹ Cf. Knuuttila 164f., 176, 179f., 188f., 191-195, 214, 221.

⁵⁰ Cf. Hintikka 64, 150 n. 6.

sentence 'Socrates is sitting', its *propositional content* (*dictum propositionis*), is 'that Socrates is sitting' ('*Socratem sedere*'), or, substantively, 'the sitting of Socrates'. Its comprehensible content is the same for the statement (*propositio*) 'Socrates is sitting' as for the incomplete expression 'sitting Socrates', for the question 'Is Socrates sitting?' and for corresponding orders or requests. The question what a statement is, in contrast to incomplete expressions, questions, orders and so on, can be answered by becoming clear about what is added to the comprehensible content, in itself only a description of a possible proposition (*enuntiabile*). This added element does not comprise a new, categorematic content but is the proposition's *statemental* or *assertoric* content. In the *propositio* a truth-value is assigned to the propositional content. 'Socrates is sitting' is explicated as, 'It is the case that Socrates is sitting', or 'It is true that Socrates is sitting'. 'Socrates is not sitting' is explicated as 'It is not the case (is false) that Socrates is sitting'⁵¹. The distinction stressed here could also suitably be formulated as that between possible and actual states of affairs.

3. When statements such as 'Socrates is sitting' are made in a speech situation, they count as statements about what is the case *at the time of utterance*. This reference to the time of utterance is usually implicit; it can be explicated by expanding the "token reflexive" 'now'⁵²: 'Socrates is sitting now', or, even more plainly, 'It is now, as I am saying this, the case (true) that Socrates is sitting'.

When such statements are discussed—as they are by logicians—particular attention is paid to something which is presupposed, automatically and therefore tacitly, in a speech situation: that the reference to the situation in which a statement is made is part of the statement. 'Socrates is sitting', said at different times, may sometimes be true and sometimes false. The truth-value of statements like this is dependent on their time of utterance; it is, so to speak, unstable.

It is our habit to make statements more precise by dating them. Instead of indicating the situation of utterance, we choose fixed times of the clock and calendar as reference points⁵³. The truth-values of statements dated in this way are, of course, stable. But the fact that

⁵¹ For this part of my presentation I shall provide only a few selected references and make general reference to my investigation mentioned in n. 5. Exemplary for the distinction between *dictum propositionis* and *propositio*: Peter Abelard: *Logica 'Ingredientibus'*, *Glossae super Perihermenias*, ed. B. Geyer (BGPhThMA 21), 326, 37-327, 41.

⁵² Cf. Hintikka 64-66, 85, 150.

⁵³ Cf. Hintikka 87, 151.

Aristotle and the scholastics proceed differently does not detract from the worth of their analyses, which deal with the more complex type of case. Since the transition from the more complex to the simpler is always easier than the other way round, their analyses are also instructive for those who are interested in a logic of dated statements.

The "token reflexive", 'now, at the time I am saying this', is not implicit only in statements in the present tense, but also in statements whose predicates are in the past or the future. The past is what happened before now; the future is what will happen after now.

4. How should we analyse statements about the past or about the future? Should the tense qualifier be counted as (1) part of the assertoric aspect or (2) part of the propositional content of a statement? In the first case, 'is the case (true)' can be made more precise by a tense operator:

- 'It was—earlier than now—the case (true) that Socrates is sitting'
- 'It is—now—the case (true) that Socrates is sitting'.
- 'It will be—later than now—the case (true) that Socrates is sitting'.

In the second case one would assign a "time signification"⁵⁴ to the verb in the *dictum propositionis*: '*Socratem sedere*' would have another meaning than '*Socratem sedisse*' or '*Socratem sedentem fore*'. The model of analysis would be:

- 'It is the case (true) that Socrates was sitting—earlier than now'
- 'It is the case (true) that Socrates is sitting—now'
- 'It is the case (true) that Socrates will be sitting—later than now'.

Closer examination shows that the question which model of analysis to follow has not yet been quite correctly put. It is in fact to be recommended that one should follow both. For a statement of type (1)—'There was a point in time at which it was true to say, "S is P"', does indeed have the same truth-value as the type (2) statement, 'It is now true to say, "S was P"' ; but these two statements are not saying exactly the same thing. To put it even more carefully and more precisely: they are accentuating the same thing in different ways. In the first case the speaker situates himself, so to speak, in another period in time, from which he makes a statement in the present tense; in doing so he draws attention to the instability of such statements about particular events. In the second case, however, the truth-value seems relatively stable: if it is now the case that 'S' was 'P', then it will

⁵⁴ Aristotle: *De Int.* c.3, 16 b 6.

be the case at every future moment that 'S' was 'P'. I want to try to clarify this distinction by showing with what instruments the medieval logicians analysed tensed statements.

(1) In statements about the past, we should bear in mind the distinction between talking about someone who existed in the past and one of his actions or states, and talking about an earlier action or state of someone who still exists now. In the former case the subject term stands (as well, at any rate) for something in the past; the tense qualifier brings about an extended range of reference (*ampliatio suppositionis*). The tense operator determines the statement as a whole (*sensu composito*); adjusting the grammar to emphasise the sense, this gives, 'This was the case: Socrates exists and he is sitting'. In the latter case, the subject term stands for something in the present; the tense operator determines, *sensu diviso*, only the verb of action or state: 'It is now the case that Socrates exists and was earlier the case that he is sitting'⁵⁵. This distinction is demanded by the analysis of tensed statements I gave first, according to which the time reference is extracted from the *dictum propositionis* and counted as part of the statemental aspect. The *dictum* is split up into various parts; for each part of the statement's content it has to be decided whether to assign it a truth-value for the present moment of time or for some earlier one.

(2) Statements in the present tense express what is or is not the case at the moment of uttering them. Statements in the past tense, though, do not apply only at the moments of time at which they are made. Both the statement, 'Socrates was sitting', and the statement, 'Socrates was standing, so he was not sitting', can indeed be true 'now', if the person making them is referring to states of affairs which have occurred at different times in the past. But if the statement, 'Socrates is sitting', has ever at any time been true, the statement, 'Socrates was sitting' (= 'It is the case that at some moment of time earlier than this one Socrates was sitting') is valid for all subsequent moments of time. Statements in the past tense are, then, valid for the whole period of time following the moment in which the corresponding present statement is true. The difference between the "short-lived"⁵⁶ quality of statements in the present tense and the

⁵⁵ Cf. William of Shyreswood, *Introductiones in Logicam*, ed. Martin Grabman, in: SB Bayerische Akademie der Wissenschaften, Philosophisch-Historische Abteilung, Jg. 1937, H. 10 (Munich 1937), 84, 12-30; 85, 16-31.

⁵⁶ This metaphor is coined by G. Nuchelmans in *Theories of Proposition; Ancient and Medieval Conceptions of the Bearers of Truth and Falsity*, Amsterdam 1973, 162; cf. Knuuttila 180.

“long-lived” quality of those in the past tense is easier to perceive in that analysis of tensed statements which distinguishes propositional contents in terms of their tenses than in the account I presented first. The scholastics recognise the distinction when they say that statements about the past are, if they are true, necessary *per accidens*. In order to make clear the exact sense of this expression it is necessary at least briefly to look at the function of modal qualifiers in general. Before I do so, I should like to make one more remark. It is logically quite unproblematic to transfer the accounts we have now achieved for statements about the past to statements about the future and to say something like, ‘Once the statement, “Socrates is sitting”, is at some moment of time true, the statement, “Socrates will be sitting”, is valid for all preceding moments of time’⁵⁷. But it is questionable whether such a transference would be sensible. The medieval thinkers hold that long-term prognoses about particular events are possible if at all only in astronomy⁵⁸, so in this type of analysis, where speaking about the future is concerned, the hiddenness of the future is usually emphasised. The transference I have mentioned becomes a serious subject of discussion, however, with regard to the question of God’s preknowledge.

5. For medieval logicians, modal logic is not a special area of the discipline. For them, rather, it is an essential part of determining the sense of any sentence at all to give its *modality*, whether or not modal terms overtly occur in it. Modal terms serve to determine the way in which subject and predicate are linked in a statement. In giving the modality one makes clear in what way the statement should be counted as true or false.

Whenever logical operators are part of a statement, it is necessary to determine their range of application, by syntactic analysis of their logical structure. The distinction between *sensu composito* and *sensu diviso* is an aid to doing this. When several syncategoremata occur together, it must also be determined which of them is the “inclusive” and which the “included”, that is, the one which falls inside the range of application of the inclusive one.

6. The basic distinction in medieval logic is that between statements which are either necessarily true or necessarily false, on the

⁵⁷ Cf. Aristotle, *De Int.* c.9, 18 b 9-11; 18 b 33-19 a 1.

⁵⁸ Exceptions are statements about the Antichrist, whose future appearance is taken to have been guaranteed by the authority of Jesus; cf. *Logica ‘Ut Dicit’*, ed. L. M. de Rijk, in: *Logica Modernorum* II-2, Assen 1967, 390, 18-31.

one hand, and contingent statements on the other. Here I shall explain the theory of necessarily true and necessarily false (= impossible) statements only as far as is essential for purposes of distinction. Statements are necessarily true if their predicate terms are contained in their subject terms; they are necessarily false if their predicate terms are incompatible with their subject terms. The theory of necessity statements and that of impossibility statements are systematically linked with each other by the following equivalences: if 'P' is part of the concept of 'S', then 'not-P' is incompatible with 'S', and vice versa. If 'not-P' is part of the concept of 'S', then 'P' is incompatible with 'S', and vice versa. Necessity and impossibility statements can be summarised as statements whose truth-values are fixed by the intensions of the concepts used in them, in short as *semantically determined* statements. Semantically determined statements are universally valid. For intensionally true statements it can be said that all possible instantiations of their subject terms are also instantiations of their predicate terms. It can be said of intensionally false statements that no possible instantiations of their subject terms will be instantiations of their predicate terms. Note that here it is required only that the terms should be able to be instantiated, not that they should have actual denotations in the present. The statement '*Homo est animal*', or '*Omnis homo est animal*', is interpreted as '*Si est homo, est animal*'.

Contingent statements are *semantically undetermined*; their truth-values are not determined by intensional considerations. Intensional examination of the terms used in them allows us to say only that in contingent statements predicate terms are compatible with subject terms, in the exact sense that the negation of the predicate term is also compatible with the subject term. Accordingly, the notion of contingency is defined by a conjunction of determinants, as follows:

'K p iff $\sim N p \ \& \ \sim \sim M p$ '; or, equivalently,
 'K p iff $M p \ \& \ M \sim p$ '.

From this definition it follows that if 'p' is a contingent statement, then ' $\sim p$ ' is a contingent statement too—and vice versa. If a contingent statement is asserted to be true, the manner of its being so will be given by the conjunction 'true, but not necessarily true', or, equivalently, ' $p \ \& \ M \sim p$ '. If a contingent statement is asserted to be false, the modal qualification will be, correspondingly, 'false, but not necessarily false', or ' $\sim p \ \& \ M p$ '.

7. The statements about particular events with which I am concerned here are all semantically undetermined, whether they deal with events in the past, present or future.

It is necessary to distinguish between the concept of semantic determination and that of determinacy of truth-value. There are semantically undetermined statements which have determinate truth-values. One type of such statements has been mentioned already. As soon as a statement about a particular event has once become true, it is true for all subsequent points in time that the statement has once been true. When such statements are termed *per accidens* necessary it is not being disputed—on the contrary, it is being affirmed—that they are *per se* not necessary, but contingent. The definition of ‘*per accidens* necessary’ is a specification of the conjunction ‘true and possible that not true’. Both parts of this conjunction are specified as to time, and qualified modally in opposite ways: something is *per accidens* necessary if it cannot be false in the present and future, but could have been false in the *past*. Take the statement, ‘It is the case that Socrates was sitting at some point in time earlier than this’; the further statement, ‘It is the case that Socrates was, at some point in time earlier than this, not sitting’ is related to the first as its subcontrary, not its contradictory. If one bears this in mind it is easy to see that one can without contradiction assert *per accidens* necessity both of ‘Socrates was sitting’, and ‘Socrates was not sitting’. The problem of logical determinism does not arise. The theory of the *per accidens* necessary reflects the law of the factual at the root of all particular facts: what is done cannot be undone⁵⁹.

8. Statements in the *present* tense about particular events also have determinate truth-values; the propositional contents corresponding to such statements, though, do not. That Socrates is sitting can at various different times be true, false, and true again; but ‘It is now the case that Socrates is sitting’ is, at every randomly chosen moment at which the statement is made, either “in a determinate sense (*determinate*) true” or “in a determinate sense false”⁶⁰.

The scholastics use the notion of necessity in order to recognise determinacy of truth-values in the case of statements in the present tense too. Here they take all possible care to avoid any confusion between the “temporal necessity” meant in this context with

⁵⁹ In scholastic works it is disputed whether this law should count as a logical principle or as a principle of nature. The question is usually discussed in concrete form: is it possible for God to restore lost virginity?

⁶⁰ Cf. Thomas Aquinas, *In Perih.* L.I 1.XIII, n. 169.

“necessity as such”. The tool they use to make the distinction is not the transference from sentences “determinate as to time” to sentences “indeterminate as to time”⁶¹, which is only apparently applicable; instead they use exact syntactic analysis. A sentence such as, ‘*Necesse est Socratem sedere dum sedet*’, is capable of various constructions, according to whether the range of application of the time conjunction ‘as long as’ and of the modal operator are fixed; the consistency of these constructions has then to be tested. The sentence can be understood (1) in such a way that the necessity operator, uninfluenced by the time reference, determines the whole sentence: ‘It is necessary that what the following states is the case: “Socrates is sitting, while he is sitting”’. Understood in this way, the sentence is *false*; it is not necessary that there should be a time at which the possibility of Socrates’s sitting should be instantiated. (Formalised, this runs as follows: ‘ $\sim N\exists t (p \rightarrow t)$ ’.) The sentence can also be understood (2) as a temporal connection in which the latter part of the sentence is distinguished from the former only by an added modal operator: ‘As long as it is the case that Socrates is sitting, it is the case that it is necessary that Socrates should sit’. In this interpretation too, the sentence must be rejected as *false*. Its latter part is false for any randomly selected moment of time; even supposing Socrates to be sitting now, the possibility that he should not be doing so is a *present* one. The conjunction ‘ $p \ \& \ M \sim p$ ’, which characterises true contingent statements, is also valid when the proposition variable is qualified by ‘ t_i ’, which indicates some particular point in time; ‘ $p \rightarrow t_i \ \& \ M \sim (p \rightarrow t_i)$ ’ is defended as consistent by the scholastics. The sentence can also (3) be interpreted in such a way that the modal operator itself is temporally qualified: ‘Socrates is sitting, and during the time in which he remains seated it is not possible that he should not be sitting’. Understood thus, the sentence is *true*. The difference between this and the rejected interpretation (2) can be clarified by formalisation:

(2) ‘ $\forall t_i (p \rightarrow t_i \rightarrow N (p \rightarrow t_i))$ ’ is false:

(3) ‘ $N \forall t_i (p \rightarrow t_i \rightarrow p \rightarrow t_i)$ ’ is true⁶².

⁶¹ Knuuttila says this (171f.) with regard to Boethius; 181 and 183f. with regard to Abelard; 211-213 with regard to Thomas Aquinas.

⁶² Cf. Peter Abelard, *Super Periermenias*, ed. L. Minio-Paluello, in: *Twelfth Century Logic: Texts and Studies*, II: *Abelardiana Inedita*, Rome 1958, nn. 61-63, pp. 36,22-38,5; nn. 76-77, pp. 41,23-42,20; *Dialectica*, ed. L. M. de Rijk, Assen 1956, 206,7-210,19.

The principle to which the Aristotelian dictum, '*Omne quod est, quando est, necesse est esse*' can be traced back is not just some semantic principle or other, but the principle of non-contradiction. The time during which Socrates is sitting now cannot be the same time as that in which he is not sitting now; the conjunction 'Socrates is sitting now and Socrates is not sitting now' cannot possibly be true for one and the same point in time. But ' $\sim M (p-t_i \ \& \ \sim (p-t_i))$ ' is equivalent to ' $N (p-t_i \rightarrow p-t_i)$ '.

9. We are only able to make predictions about future events insofar as we can conclude from what is the case to what will be the case. We extrapolate a series of like events beyond the present time, or we infer from some constellation of causes existing now to their future effects. In such statements the future event is not described as an isolated occurrence, but instead as an instantiation of some rule or law. Because something usually happens (*contingens ut in pluribus, contingens natum*), it can be expected to happen in future too.

The following distinctions about prognoses can be made with regard to the possible relationships between given causes and their expected effects⁶³. (1) A future effect is so situated in its cause that the cause inevitably, that is, necessarily, brings with it its effect. Given that it is certain that the causal event occurs, the prognosis of its effect also has the status of certainty. The Aristotelian and scholastic view is that prognoses of this kind are possible only in celestial physics. (2) A cause or a constellation of causes does indeed normally bring with it some future event, but it cannot be ruled out that in exceptional cases the effect will not follow—as a result of disturbing factors or because causal components assumed to be given do not in fact take place. The prognosis of the occurrence of the effect is well grounded, but has here only probable status. According to Aristotle and the scholastics, all prognoses in the natural sciences which concern earthly events are of this kind. (3) When some future event is being discussed, those discussing it may consider themselves in a position to permit the event's occurrence or non-occurrence (*contingens ad utrumlibet*). The relevant alternative can be formulated in advance; however, no truth-value can justifiably be assigned to any part of it. (4) The opposite concept to the *contingens ut in pluribus* is the *contingens ut in paucioribus*. What seldom happens is, though, not a state of affairs simply formulable in

⁶³ Cf. Thomas Aquinas, *In Perih.*, I.I 1.XIII, nn. 172, 174; on this, vid. my interpretation mentioned in n. 19.

advance. One can only talk about anomalies and exceptions to what normally and naturally occurs by distinguishing what normally happens from what necessarily happens. As soon as the contents of possible anomalies are described, they are already being treated as instances of some rule or law⁶⁴.

10. Anyone who talks about particular events must refer to natural causes and specific explanations; recourse to God's creation or to his ability to work miracles is not admissible in the science of nature⁶⁵. Thomas Aquinas emphasises that possibility and impossibility, contingency and necessity must be spoken about in such a way that the standards of imputing them are their relationships to their "*proximate*" and "*proper*" causes. It may well be the case, though, that some *concur-sus causarum* is not explicable in terms of particular proximate causes and so has an accidental relationship to them, but that an explanation can after all be found for it if it is traced back to some more general cause. Lastly, it is not possible to impute any obstacle to the *universal, Godly cause of all that is*. Nonetheless, neither from God's omnipotence nor from his prescience, to which everything that ever happens is given in a timeless present, can it be inferred that our estimation of events as contingent is simply an expression of our finite standpoint, seen from which deterministic relationships cannot be properly traced. The concept of contingency is not merely epistemic, it is an ontological one. Thomas solves the theological problem of determinism in the following way:

"The will of God must be understood as outside the order of being, as a cause underlying the whole of what is and all its diversities. But distinctions in what there is are 'possible' and 'necessary'. And therefore necessity and contingency in things, and the distinctions between them, made in terms of the functions of their proximate causes, have their source in the will of God itself. For to those effects which he wished to be necessary he gave necessary causes; and to those effects which he wished to be contingent he gave causes which operate contingently, that is, causes which may be deficient. According to the ways in which such causes are determined their effects are termed either 'necessary' or 'contingent', although all depend on the will of God as their principal cause, which transcends the order of necessity and contingency"⁶⁶.

Duns Scotus's new modal theory does not arise from any discovery of internal difficulties in the views of earlier scholastics and especially

⁶⁴ Cf. Aristotle, *Metaph.* Epsilon 2, 1027 a 21-26; on this, vid. the commentary by Thomas Aquinas, L.VI 1.II.

⁶⁵ Cf. Georg Wieland, *Albert der Grosse und die Entwicklung der mittelalterlichen Philosophie*, in: *Zeitschrift für philosophische Forschung*, 34 (1980), 590-607; here 592 with references to Abelard and Albert, cf. 594 n. 21.

⁶⁶ Thomas Aquinas, *In Perih.*, I.I 1.XIV, n. 197.

of Thomas. For theological reasons Scotus attacks the principle that we can judge of the necessity or contingency of the things or events in this world by looking at their proper causes. For him, the functioning of the first cause alone can determine whether there should be only necessary events or whether there should also be events which may happen and may not: "Every secondary cause causes insofar as it is moved by the first cause". If it were assumed that there were a first cause which caused everything else necessarily, its necessity would be transferred to every secondary cause and thus to every caused event. That there are contingently caused events—those which, when they happen, could also not have happened—can only be explained if the first cause causes contingently. But since obstacles to or other deficiencies in the working of the first cause are unthinkable here, a contingently causing first cause can only be imagined as a will—so that the cause itself determines whether or not it should take effect⁶⁷.

Avicenna had thought of God as that being which includes its own being in its essence. He had opposed to this being, necessary in itself, the totality of all the rest of being, which can without inconsistency be thought of both as existing and as not existing. What is in itself only possible exists, when it does exist, through some other cause, indeed through that being which is necessary in itself, God. As an effect of the first cause it is, according to Avicenna, necessary⁶⁸. Duns Scotus adopts the whole metaphysics of essences from Avicenna, but without accepting his view that everything brought about by God necessarily happens as it does happen. What takes place because of God is not brought about necessarily by him; it is freely willed by him.

It would be an interesting task to investigate how far, in Leibniz and in modern authors, the semantics of possible worlds is expressly or implicitly bound up with a metaphysics of essences.

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⁶⁷ Cf. Duns Scotus, *Tractatus De Primo Principio*—*Abhandlung über das Erste Prinzip*, ed., transl. and with a commentary by Wolfgang Kluxen, Darmstadt 1974, ch. IV, sentence 4, n. 56; cf. Knuuttila 218-221 and—for a detailed interpretation in the context of Duns Scotus's metaphysics—Etienne Gilson, *Johannes Duns Scotus. Einführung in die Grundgedanken seiner Lehre*, transl. by Werner Dettloff, Düsseldorf 1959, ch. 4, II, esp. 326-328; III, 331f., 335-342; IV, 347f.

⁶⁸ Cf. Guy Jalbert, *Nécessité et Contingence chez Saint Thomas d'Aquin et chez ses Prédecesseurs*, Ottawa 1961, ch. II; Etienne Gilson (see n. 62), 338f.; cf. also the passages to be found in the index on 'Existenz', 'Logik des Nichtnotwendigen', 'Mögliches', 'Necessitarismus', 'Nichtnotwendig(es)', 'Nichtnotwendigkeit', 'Notwendig(es)', 'Notwendigkeit'.