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MODALITIES AND SCOPE IN SCHOLASTIC LOGIC FROM A LINGUISTIC POINT OF VIEW

by

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Introduction.*

The discovery and the introduction of the works of Aristotle into Europe had a very deep effect in the scholarly life of the Middle Ages. As it is well known, there existed already an Aristotelian tradition based on the translations of the Roman Boethius (480–525), the logica vetus (old logic). However, the rediscovery of the late works of Aristotle in the XII century, the logica nova, was going to mark the beginning of very important achievements in all branches of philosophy in the wide sense of the word.¹

The evolution of Medieval thought is usually divided into three periods: a transitional period which ends more or less with the Parisian Peter Abelard (1079–1142); a creative period beginning with the introduction of the new translations of Aristotle, extending from 1150 to the end of the XIII century; and finally, a period of elaboration, beginning with William of Ockham (ob. circa 1350) till the Renaissance. This paper will concentrate on theories evolved during the creative period, although it will sometimes be necessary to consider sources which go as far back as Aristotle and to use works which represent the end of the Scholastic period.

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¹ In the XIII century a distinction was made between the logica antique and the logica moderna. The logica antique embraced the logica vetus and the logica nova which I mention above. I will return to the logica moderna later on. It includes the new developments of Scholastic logic such as the study of the properties of terms and the tracts on syncategorematic words.
1. Scholastic grammar and Scholastic logic.

Aristotle had already seen the necessity of a close connection between logic and grammar, and that of the integration of grammar into philosophy. This standpoint disappears after the Stoics, and it is not found in the Roman tradition which was to influence the very early Middle Ages. However, from 1150 on, a new tendency can be felt: philosophical theorizing about language as part of the aims of grammar. The most influential work of this type is that of Peter Helias; he writes a commentary on Priscian in which he searches for the philosophical explanation for the grammatical rules that Priscian had simply presented. John of Salisbury (c. 1115–1180) attacks in his Metalogicon those who, in grammar, remain as mere commentators of Priscian, and he stresses the importance of logic ('cum itaque logica tanta sit vis'). For him grammar forms a part of logic.

The search for explanation and justification, and the consideration of grammar as a branch of speculative philosophy, remains a unique characteristic of the Schoolmen. The Renaissance despises the interests of its immediate predecessors. Sintheim, cited by Thurot (1964: 497), says that it is unnecessary to know the reason why a given verb governs a certain case. One can simply say that old grammarians agreed by convention that it would be that way rather than some other way. For instance, the German verb to be (byn) governs a nominative (ick) because it was once decided by grammarians that it should be so, but if they had agreed that the suppositum (subject) of the verb be in the accusative, byn would govern the accusative. In the same vein Despautère (Thurot 1964: 498) advises that if somebody asks why a given word is governed in a given way, the answer should be: by virtue of the will and the usage of the grammarians and of the best authors. The theories of medieval grammarians, in particular the Modistae, have been extensively studied by J. Pinborg (1967) and by G. L. Bursill-Hall (1972).

Grammar was very much influenced by philosophy and by logic, as many have already pointed out. What has only been mentioned in passing by linguists, is that philosophy in general, and logic in particular, were very much influenced by grammar and by a deep interest in the properties of natural language. Linguists have commented on this aspect of Scholasticism (Robins 1951: 87), but at the same time have mostly ignored the purely linguistic material presented in philosophical works to concentrate on treatises on the modes of signifying. The interweaving of grammatical theory and logical theory has been noticed by logicians as well, but in many cases with contempt because it detracts from purely logical thought. Commenting on an early logical work of Thomas Aquinas of a highly
syntactic character, Bochenski (1937: 686) considers that it is vitiated by a strange grammaticalism ('une explication viciée par un étrange grammaticalisme'). In his discussion of the text, he complains again of the fact that Aquinas classifies modal propositions according to their grammatical structure:

‘Propositio modalis dividitur apud S. Thomas non tantum ex parte modi, sed etiam — iam in opusculo nostro [De propositionibus modalibus] — ex parte structurae suae . . . Attamen hoc loco explicatio divisionis valde formalistica, ne dicam grammaticalis, est’.
(Aquinas 1940: 207)

and he continues in a tone of reprobation that Aquinas considers for his classification merely the position of the modal operator in a given sentence (‘agitur ergo, apparenter saltern de mero loco modi’ (209)). This according to Bochenski, is an impediment to a complete (logical) understanding of modal propositions, and the tract has been considered as a weak contribution to the development of logical theory.

The interest in the properties of natural language in purely logical works is a development of the central period of Scholasticism. Abelard’s logic is not yet deeply influenced by grammatical theory while the fully developed terminist logic of William of Sherwood (c. 1200–c. 1266) and his contemporaries is under the full impact of grammar (de Rijk, 1962–1967). This can be clearly seen in the studies to which I will return later on. Such a situation arises from the fact that all Medieval logic deals mainly with sentences of a specific language, Latin, and there is no artificial language in the discussions of the period. Scholastic logic is an endeavour to discover and abstract the rules of Latin. This explains why it is so interwoven with the theory of grammar. The difference between grammar and logic was stated in numerous texts: logic deals with the distinction between truth and falsehood (‘homo per logicam intendit discernere finaliter verum a falso’ (Thurot 1964: 128)), while grammar treats of the congruity of discourse (‘grammatica

2 Here the term terminist refers to a specific development which characterizes Scholastic logic in its productive or more important period. Logicians such as William of Sherwood and Peter of Spain develop a logic of terms, proprietates terminorum, in isolation which they present under separate headings from the logic of propositions and which constitutes a theory of semantics as much as a theory of logic. Terminist in this logical sense is not to be considered as a synonym of nominalist, which is done sometimes in general discussions of philosophical trends (see for instance de Wulf (1925)). Some of those who develop the logic of terms are realists. Logic is not influenced by the school labels which are so important to other aspects of philosophy. There is essentially one medieval logic. Therefore, I will ignore the distinction realism/nominalism as of no consequence to the problems I wish to discuss here.
136  MARÍA-LUISA RIVERO

... finaliter est propter expressionem conceptus mentis per sermonem congruum' (Thurot 1964: 128). However, the distinction was not made in practice at all times, and both logic and grammar dealt with discourse.

This paper is an attempt to incorporate some of the ideas found in logical tracts into the realm of linguistics, because I feel that they are of as much interest to the modern linguist as they are to the modern logician. I will present some medieval theories connected with some syntactic properties of syncategorematic terms (the word is defined in the following section) dealing with ambiguity of scope. The discussion will show the influence of grammar on logic and the need for modern linguists to consider treatises on Scholastic logic among the relevant literature of the linguistic ideas of the period.

2. The logica moderna: a linguistic view.

As I have already pointed out, after the translation of the late works of Aristotle there are a number of new developments in Scholastic logic known as logica moderna. This logic is clearly grammatical in bent, as its two most important branches indicate: a) studies on the properties of terms, and b) studies on syncategoremata. This division is based on the analysis assigned to sentences in the Aristotelian tradition. A sentence has two fundamental parts: a subject and a predicate, and everything else must be considered as a modification of these two elements, or of their union. Studies on the properties of terms deal with predicate and subject; studies on syncategoremata deal with modifications.

Studies on the properties of terms, Tractatus de proprietatibus terminorum or Parva Logicalia, discuss the significative function of substantive terms and predicates. They also study relative pronouns, genericness, and specificity. These questions have received wide attention in the philosophical literature (Wallerand 1913; Mullally 1945; Boehner 1952; de Rijk 1962-67, among others), and much less in the linguistic literature. They will not be discussed in this paper.

3.1. Syncategoremata.

Studies on syncategoremata, Tractatus de syncategorematibus, deal with the syntactic and semantic properties of items as those in the following list, taken from William of Sherwood’s tract (1968 translation): omnis ‘every’ or ‘all’, totum ‘whole’, dictiones numerales ‘number words’, infinita in plurali ‘infinitely many’, uterque ‘both’, quaelibet ‘of every sort’, nullus ‘no’, nihil ‘nothing’, neutrum ‘neither’, praeter ‘but’, solus ‘alone’, tantum ‘only’, est ‘is’, non
MODALITIES AND SCOPE IN SCHOLASTIC LOGIC

This paper will concentrate on discussions of the scope of syncategorematic words in general, and in particular those which are modal such as necessarily and contingently.

Syncategorematic terms can be considered in a more or less grammatical way as modifications of the noun and the verb which normally constitute a proposition in Latin. They are determinations of other words or of their combination up to the level of the sentence. Terms have meaning, but not all of them have an object signified by them, some lack a definite significate, and as a result, they cannot be subject or predicate of a proposition unless they are used with another term (a categorematic one); they are syncategorematic terms, that is, 'cosignifying' (Boehner 1952: 22).

In Scholastic times syncategorematic terms had a threefold classification: a) some of them could be considered as modifications of the subject, b) others as modifications of the predicate, and c) they could also be considered as modifications of the relation (compositio) between subject and predicate.

'It should be noted, then, that adverbial modes can occur in discourse in two ways — viz., by determinating either the action itself of the verb or the inherence of the predicate in the subject. Take, for example, “Socrates is running contingently”. Here the word “contingently” can determine the action as such, in which case the sense is “Socrates’ running is contingent” (cursus contingens est Sorti), and [the proposition] is not modal. Or it can determine the verb itself in respect of (propter) its inherence [in] or composition [with the subject], in which case the sense is “the composition ‘Socrates is running’ is contingent”. In this case [the proposition] is modal, since [the adverb] determinates the action of the predicate in the subject'.


William considers that in Latin an adverb such as contingently is used in a way which allows that it be interpreted either as a modification of the verb alone or of the whole proposition. That is, it is a term which can have different scopes. This is not a property of all Latin adverbials, only of the modal variety. I will return to this question later on.

3 Not all terms in the list should be considered on a par. It is in William of Sherwood's tract that we find for the first time an interest in incipit 'begins' and desinit 'ceases'. He classifies them as exponible terms (terms having an obscure sense which requires exposition).
Syncategoremata are considered as responsible for many ambiguities in discourse. Scholastic logicians become very interested in the study of these ambiguities and they undertake a very thorough examination of the items which can make a proposition unclear. However, since they base their analyses on a natural language, Latin, their discussions come very close to being grammatical expositions of the syntactic properties of syncategoremata. The various ways in which ambiguity may arise are carefully examined and this interest 'leads men to spend much time and effort in elucidating the subtleties of ordinary usage' (Kneale 1962: 227).

It is the properties of scope of syncategorematic terms which led Peter of Spain to the postulation of very general rules which try to predict symptomatic environments for ambiguity:

'Whenever any negation is posited in a proposition with any syncategorematic word or even by implication, the statement is equivocal by virtue of the fact that one of these syncategorematic words can include the other or can be included by the other'.

(Peter of Spain 1964: 27).

The above rule is expanded to apply to any two syncategoremata:

'Whenever two syncategorematic words, each determining the other, are posited in the same statement, or one syncategorematic word is posited twice, being able to determine itself, the statement is ambiguous by reason of the fact that one can determine the other and vice versa'.

(Peter of Spain 1964: 38).

Perhaps one of the most interesting developments dealing with aspects of scope is the treatment of modal terms. The solutions proposed are heavily influenced by linguistic considerations.

3.2. Scholastic modalities.
Following an old tradition, Schoolmen classified propositions as either assertoric or modal. A modal proposition is one which is in some way modified by a modal term or modality, that is, which contains it. All Schoolmen agreed on the existence of at least four modalities in their modal logic: necessary, possible, contingent, and impossible.

Modalities are closely connected with syncategorematic terms because they appear often in Latin as adverbials, that is, as modifications, and not as subject or predicate. In those cases in which they appear as adjectives,
that is, as categorematic terms or predicates, Schoolmen considered that they had the same properties as syncategorematic terms. Many logicians felt that an adjective in the configuration

\[ \text{NP} - \text{est} - \text{MODAL ADJECTIVE} \]

could have narrow scope or wide scope. Because of this property modalities were recognized by Schoolmen as a source of ambiguity.

For a Schoolman modal words can modify the whole sentence (dictum), and the proposition is then called a modal de dicto, or they can modify a part of the sentence and the proposition is a modal de re. Although we will see that the grammatical structure plays a very important role in the modal character of a proposition, a sentence of the type *A man is able to write while he is not writing* can be assigned two different readings. The first reading in which the modality is external or de dicto and applies to the whole sentence is false. It can be paraphrased as *It is possible for a man to write and not to write at the same time*. The second reading has an internal modality or modality de re, with the paraphrase *A man has the ability to write at the moment he is not actually writing*. In the first reading the possibility is affirmed of the proposition *A man who is not writing is writing*; in the second reading it is affirmed of the man. Under this interpretation of modalities medieval logicians create a set of modal forms so that for each modal assertion de re, there is a modal assertion de dicto. Before discussing the diverse opinions as to the way the grammatical structure of a modal sentence influenced its sense, I will present a formalization given by Prior, which, in his opinion, ‘brings out the distinctions which the medieval logicians made and does not bring out ones which they neglected’ (Prior 1952: 175). In the following formulas \( \Diamond \) stands for possibly and \( \Box \) for every.

4 Hofmann (1966) has classified English modals into what he terms epistemic and root modals; these two divisions correlate in some cases with Scholastic modalities de dicto and de re. For instance, the English modal *can* has an epistemic sense which means possibility in general as in *How can you believe what he told you?* For a medieval logician this would be a meaning de dicto in which the possibility is assigned to the proposition as a whole. The second meaning for the modal *can* is the root one as in *I can speak French* in which an ability is assigned to an individual. To a Scholastic logician this second meaning is de re. Ross (1969) and Perlmutter (1970) have formalized these two senses of English modals in a way which correlates in some way with the medieval distinction: a modal with an epistemic sense has an underlying structure where it functions as an intransitive verb with a sentential subject, that is, it enters into the relationship subject-predicate with a complete sentence. A modal with a root sense is a matrix verb whose subject is personal, that is, it enters into the relationship subject-predicate with a term and not a proposition.
The assertoric form (a) gives rise to a modal statement *de dicto*, 1, and a modal statement *de re*, 2:

(a) $\Diamond A$ is $B$ 'Every A is B'
(1) $\Diamond (\Diamond A \text{ is } B)$ 'It could be that every A is B'
(2) $\Diamond A (\Diamond \text{ is } B)$ 'Every A has a chance of being B'

1 corresponds to *Possibly everyone will win*; 2 is *Everyone has a chance of winning*. In this formalism combining quantification with modality we can see clearly the meaning of the rules given by Peter of Spain, quoted above (p. 138). If there are two syncategoremata in a statement (in this case *every* and *possibly*), the first can include the second and vice versa. If we consider William's statement on modal adverbials quoted above (p. 137), we can see that he indicates that *contingently* can be an external modality, parallel to 1 in its formulation, or an internal modality like the one in 2.

In present-day syntactic terminology we can interpret these Scholastic views in the following terms. If we take the modal term to be a verb taking a sentence as its argument, and the quantifier *omnis* as a verb as well, the left to right order indicates degree of embedding. That is, when we speak of a modality *de dicto* we are referring to the highest predicate in the tree, that clause in which the rest of the structure is embedded. When we speak of a modality *de re* we are referring to a modal predicate which is embedded, and in this particular case, which is dominated by the quantifier. In the following discussion we will see that this is but one possible interpretation of medieval theories, because Schoolmen pondered over what a transformationalist today would term the contribution of derived or surface structure to the scope of modalities.

We have seen that in principle a modal word could, when in a proposition, modify it as a whole, or just in part. However, when dealing with specific examples of Latin, Schoolmen realized that this logical principle did not apply generally, but that the location of the modal term influenced its interpretation as a modality *de dicto* or *de re*. Another grammatical problem which Schoolmen had to face was that sentences which in structure were assertoric, e.g. *It is possible that Socrates runs*, or *that Socrates runs is possible*, had nevertheless modal sense and the same logical force as sentences whose predicate was modified by a modal adverb, that is, the grammatically 'true' modals. The linguistic aspects of modality led to two different approaches in the XIII century, views which continue until the end of the Scholastic period. The two different approaches to the scope of modalities can be expressed with a modern terminology in the following way:
a) There are logicians who classify modal propositions according to their underlying structure, that is, to their sense, and who overlook surface structure aspects. William of Sherwood belongs to this group in a clear way, and Peter of Spain follows this procedure to a great extent.

b) There are logicians who, influenced by the grammatical aspects of Latin, merely consider the surface structure of modal sentences. This second group includes Thomas Aquinas in the XIII century, and late Schoolmen such as Paul of Pergula.

I will first study the group which considers the sense or meaning of propositions more important than their grammatical structure. We find these ideas in William of Sherwood. My discussion is based on William's *Introduction to logic* (1966 translation) where he talks of modal propositions quite extensively. William first makes the distinction between assertoric statements and modal statements:

‘An assertoric statement, then, is one that simply signifies the inherence of the predicate in the subject — i.e., without determinating how it inheres. A modal statement, on the other hand, is one that does determinate the inherence of the predicate in the subject — i.e., one that says how the predicate inheres in the subject’.

(William of Sherwood 1966: 40).

Under the definition given by William it should be quite clear that a statement of the form that Socrates is running is contingent is not modal because contingent does not determinate the action of the predicate is running in the subject Socrates. The example is, strictly speaking, an assertoric statement whose predicate is is contingent and whose subject is that Socrates is running. William argues that a sentence of such a form could not be modal any more than a statement with a predicate signifying exclusion is an exclusive statement. Kretzmann, the editor and translator of the book, adds the following explanation as a footnote:

‘“Alone” is a word signifying exclusion, but when it occurs as a predicate — as in “Socrates is alone” — the result is not an exclusive statement — i.e., a statement in which some or most individuals or kinds are excluded from a predication that can be affirmed (or denied) of the others. Thus “Socrates alone is running” is an exception statement but “Socrates is running alone” is not... (...). Similarly, “squaring the circle is impossible” is not modal but assertoric while “the hypotenuse is necessarily greater than either of the other two sides” is a modal statement’.

(William of Sherwood 1966: 43, ft. 73 by Kr.).
But William realizes that semantically and logically speaking, *that Socrates is running is contingent* and all statements having a sentential subject and a modal term as predicate are truly modal and that the reason why they cannot be called modal is purely syntactic or grammatical. He then looks for the way in which he can avoid such a contradiction: a statement which is modal semantically speaking, and assertoric syntactically speaking. In other words, how should one classify a statement which is modal in underlying structure, but non-modal in surface structure? William's discussion is very interesting in that it very clearly reveals the qualms which medieval logicians experienced in their interest for natural language coupled with their search for a rigorous logic. Let us see the question in detail.

I have indicated that examples of the form *that Socrates is an ass is impossible* have all the characteristics of modal statements. However, the medieval definition of modal propositions prevents us from calling them modal because the mode *impossible* is the main predicate. First William looks for a grammatical solution to this problem. A statement is modal, he says, not because any of its clauses is modal, but because the main clause is so. The sentence *that God necessarily is known to me* is not modal although the subordinate clause is modal because of the adverbial *necessarily*. That is, the mode must qualify the main clause for a given construction to be modal. Since examples such as *that Socrates is an ass is impossible* are modal in force, William proposes the following syntactic analysis to reflect this fact: the sentence *Socrates is an ass* becomes the main clause with *Socrates* as subject and *is an ass* as predicate. This main clause is made modal by the occurrence of the mode *impossible* in the subordinate clause formed by *is impossible*. The structure William is proposing treats *is impossible* much like a relative clause. But he is not convinced of the theory he is advancing because he finds it too elaborate and counterintuitive. Finally, to reflect the fact that statements with a sentential subject and a modal predicate are genuinely modal he calls them *de modo*, that is, involving a mode. He claims to take his terminology from Aristotle, but Aristotle did not make the distinction, and he did not have a term corresponding to *mode* or *modal*. The term *modal proposition* originated with Ammonius.

It is interesting to see how considerations of grammar are mixed with considerations of logic, because, after all, a modal proposition need not be defined in terms of the grammatical structure of Latin. But William of Sherwood defines the notion *modal statement* in a grammatical way and immediately runs into problems because of his linguistic approach. Nevertheless, he realizes that the surface form of a statement is not the best criterion for its classification. When he is struggling with the difference between
surface syntax and semantics, he says that two sentences with different forms in discourse may nevertheless be identical in respect to what is signified. In other words, William comes close to stating that two surface structures may correspond to one unique underlying structure, and his solution to sentences of the type discussed above indicates that he considers the underlying structure more revealing than the surface structure:

'In another respect, if we consider what is signified (rem significatum [sic]) we shall say that the subject of the dictum is the principal subject and that its predicate is the principal predicate, and that therefore they are modal statements. For if I say “that Socrates is running is contingent”, it is just the same, with respect to what is signified (secundum rem), as if I were to say “Socrates is contingently running”.

(William of Sherwood 1966: 45).

Another logician who proceeds semantically in his treatment of modal propositions is Peter of Spain. Speaking of the relationship between subject and predicate, composition, he introduces the medieval notion of supposition (that for which an expression stands) to define the scope of a modality and does not establish a relationship between the syntactic properties of modal terms and their logical force:

'There are two kinds of composition. The first kind arises from the fact that some dictum can suppose for itself or a part of itself, e.g. “that he who is sitting walks is possible”. For if the dictum “that he who is sitting walks” is wholly subjected to the predicate “possible”, then the proposition is false and composite, for then opposed activities, sitting and walking, are included in the subject, and the sense is: “he who is sitting is walking”. But if the dictum supposes for a part of the dictum, then the proposition is true and divided, and the sense is: “he, who is sitting, has the power of walking”... And similarly: “that a white thing is black is possible”.

(Bochenski 1961: 184).

Composite is equivalent to de dicto; divided to de re. Peter agrees that only when the modal term qualifies the whole proposition is the sentence truly

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5 William concludes that he can treat sentences with a subordinate clause and a modal adjective as predicate of the matrix sentence in the same way he can treat a simple sentence qualified by a modal adverbial. One unique underlying analysis suffices both for Contingently and for It is contingent. Although William of Sherwood is the only Schoolman I have consulted who states this conclusion explicitly, it is clear that other Scholastic logicians discuss examples with modal adverbials and modal adjectives as if they were derived from a unique underlying source, assigning to them identical sense and properties of scope.
modal ('Unde solus ille modus qui compositionem determinat facit propositionem modalem et solum de ipso intendimus' (Peter of Spain 1947: 11)).

He is less concerned than William of Sherwood with grammatical subtleties, and considers that a sentence of the type of *Socratem currere est possibile* is truly modal without having qualms about the linguistic status of *possibile* ('In modalibus dictum debet subici, modus autem predicari: dictum ut "Socratem currere", modus ut "est possibile"' (1947: 11)).

Another contemporary who classifies modal propositions according to their sense is Albert the Great (1193-1280). For him a modal *de dicto* is one in which the mode applies to the whole *dictum* or embedded clause. His examples are interesting in that, unconcerned with aspects of surface syntax, he considers *Contingit omnem hominem esse animal*, that is, a structure in which an infinitive clause is the subject of the impersonal third person verb *contingit*, as a true modal and equivalent to *Omnem hominem esse animal est contingens* 'That all men are animals is contingent':

'Dico autem sensu compositionis sumptam, in qua modus refertur ad totum, sicut cum dico: "contingit omnem hominem esse animal", hoc est: "omnem hominem esse animal est contingens"'.

(as cited by Bochenski in Aquinas 1940: 193, v. 41).

In conclusion, I find that in this first group of logicians the grammatical tendency, although visible, is minor. In the case of William of Sherwood the preoccupation with surface syntax is very clear, but he overcomes it to present a classification of modal propositions which goes beyond the particularities of Latin.

The second group of logicians I will discuss are not so homogeneous chronologically speaking. They can be classified together because of their extreme grammaticalism, their concern with aspects of the surface structure of Latin in their discussions. In the XIII century a representative of this tendency is Thomas Aquinas, and in the XV, Paul of Pergula.

In his logical tract *De propositionibus modalibus*, edited by Bochenski, Thomas Aquinas defines what is a modal proposition and what is an assertoric one (*de inesse*). His classification is based on the surface location of the mode. A modal proposition has the mode in final position, in that location where the predicate is normally found. An assertoric proposition has it in initial position, in subject position. The sentence *Socratem currere est possibile* 'For Socrates to run is possible' is truly modal because the subordinate clause *Socratem currere* is in subject position, while the mode *possibile* is in predicate position. However, if the above sentence is converted
into *Possibile est Socratem currere*, it becomes assertoric because *possibile* is in subject position. In summary, because the predicate determines the subject and not vice versa, for a proposition to be classified as modal, the mode must be predicated. Aquinas adds that the verb of the main clause (*currere*) must appear in subject position so as to be able to be qualified by the modality. When the *dictum* is predicated, the proposition is not modal. I quote the key paragraph of this discussion:

> 'Quando ergo dictum ponitur in subiecto et modus in praedicato, tunc est propositio modalis, ut cum dicitur “Socratem currere est possibile”. Si autem convertatur, erit de inesse ut cum dicitur: “possibile est Socratem currere”.'  
>  
> (Aquinas 1940: 191).

When the mode *possibile* appears at the beginning of the string, it is no doubt considered as an indeclinable noun. Aquinas does not discuss the structure any further but it is Pseudo-Scot who clarifies the matter in an indirect way. He says that the universal proposition which corresponds to *Possibile est Socratem currere* is *Omne possibile est Socratem currere* in which the quantifier *omne* 'every', in its neuter and nominative form, modifies *possibile*. The analysis becomes even clearer when he states that the contrary is *Nullum possibile est Socratem currere* in which the negative quantifier *nullum* 'none' modifies the noun *possibile*:

> ‘“Possibile est Socratem currere” . . . sua universalis est ista: “Omne possibile est Socratem currere”, sua contraria (in textu corrupte: contradictoria) ista: “Nullum possibile est Socratem currere”.’  
>  
> (as cited by Bochenski, Aquinas 1940: 191).

Once he has determined that a modal proposition can never be one in which the mode precedes the rest of the string, Thomas classifies modal propositions in the traditional way as *de dicto* or *de re*. His method is equally syntactic. A modal *de dicto* has the *dictum* as subject while the mode is predicated: *Socratem currere est possibile* 'that Socrates run is possible'. A modal *de re* has the mode placed within the *dictum*, that is, interrupting it, as in *Socratem possibile est currere*, which for Thomas means 'for Socrates running is possible'.

> ‘Propositionum autem modalium quaedam est de dicto, quaedam de re. Modalis de dicto est, in qua totum subicitur dictum et modus praedicatur, ut cum dicitur “Socratem currere est possibile”. Modalis de re est, quando modus interponitur dicto, ut cum dicitur “Socratem possibile est currere”.’  
>  
> (Aquinas 1940: 193).
Aquinas classifies modal propositions according to the location of the mode in surface structure, in the same way that he distinguishes between modal and assertoric propositions.\(^6\)

William finds that an example such as Sortes currit contingenter 'Socrates runs contingently' is ambiguous (see quotation on p. 137). Although the mode is in final position, it can have as its scope Sortes or Sortes currit. For Thomas the location of the mode determines that it can only modify the relationship between subject and predicate, never a term in isolation.

The interpretation given by Thomas to these propositions is not influenced by the fact that he is talking of matrix-subordinate clause constructions, while William discusses simple sentences qualified by modal adverbs. I think that the reason behind the disparity must be found in surface structure aspects of the scope of modalities in Scholastic Latin which prevented a number of logicians from separating logic from natural language. Evidence for this can be found in the writings of William, who literally fought natural language in order to arrive at a purer logic. Although he tries not to define modal propositions by their syntactic characteristics, William of Sherwood (1966: 45) finds that Sortes contingenter currit 'Socrates contingently runs' is not ambiguous; contrary to Aquinas' interpretation, the mode must qualify the composition of subject and predicate. However, a very similar example but for the location of the mode, Sortes currit contingenter, is considered as ambiguous on p. 41. It has an interpretation de re and one de dicto, again contrary to Aquinas who finds this sentence ambiguous.

\(^{6}\) In later works Aquinas' theory of modal propositions leaves its syntactic bent, to take a parallel course to that of his contemporaries. Bochenski (Aquinas 1940: 209) mentions the interpretation given to the modal Omne scitum a Deo necessarium est esse in the Summa Theologia. Aquinas finds that this sentence is ambiguous: it can have a reading de re and one de dicto. In the first interpretation, it is false and a paraphrase of omnis res, quam Deus scit, est necessaria 'everything, which God knows, is necessary'. In the interpretation de dicto, it is true and equivalent to hoc dictum: 'scitum a Deo esse' est necessarium 'this dictum: 'to be known by God' is necessary':

'haec propositio "omne scitum a Deo necessarium est esse" conuuei distinguui. Quia potest esse de re vel de dicto. Si intelligatur de re, est divisa et falsa; et est sensus: "omnis res, quam Deus scit, est necessaria". Vel potest intelligi de dicto, et sic est composita et vera; et est sensus: "hoc dictum: 'scitum a Deo esse' est necessarium"'.

(Aquinas 1940: 209).

The above paragraph represents a new vision of modal propositions in which grammatical considerations have disappeared. Notice that according to the tract De propositionibus modalibus, Omne scitum a Deo necessarium est esse could only be understood as a modal de re because the mode or matrix predicate necessarium est is inserted in the embedded clause (modus interponitur dicto) omne scitum a Deo esse 'all known by God be'. In modern dress the underlying structure of this sentence is, roughly,

\[
\begin{align*}
\text{s}_1 [ \text{NP} \text{s}_2[\text{omne scitum a Deo esse}] \land \text{NP} \text{vp[necessarium est]} \text{vp}] \text{s}_3,
\end{align*}
\]
unambiguous and with an interpretation *de dicto*. It seems to me that the location of the mode in surface structure, be it a categorematic or syncategorematic term, must have influenced the interpretation of Latin sentences. The differences of opinion probably mirror attempts to capture these interpretation rules of Latin.

In his *Summulae Logicales* (1947) Peter of Spain finds that the sentence *Homo necessario currit* 'man necessarily runs' has an interpretation *de dicto* ('Cum enim dicitur: “homo necessario currit”, hic significatur quod ista compositio sit necessaria'). The mode can be interpreted as qualifying the whole sentence, although it interrupts the composition. This is contrary to Aquinas' rule.

As a last example of grammaticalism, I will present the work of Paul of Pergula (1961 edition). Paul of Pergula is a late Schoolman who is not very well known. He was a student of Paul of Venice and died in 1451. His two short works, *Logica* and *Tractatus de sensu composito et diviso*, show a very strong influence of the surface syntax of the Latin terms he discusses.

In his *Logica* he defines modal propositions according to the syntactic location of the mode. Modals *de dicto* or composite are those in which the mode precedes or follows the *dictum*, as in *Necessario homo est animal* 'man is animal necessarily', or in *Homo est animal necessario* 'man is animal necessarily'. A modal *de re* or divided is one in which the mode is inserted in the *dictum* as in *Homo necessario est animal*:

> 'Modalium alia de sensu composito est in qua modus praecedet vel finaliter subsequit dictum ut: Necessario homo est animal vel homo est animal necessario.

Modalium alia de sensu diviso est illa in qua modus mediat inter partes dicti ut: Homo necessario est animal'.

(Paul of Pergula 1961: 12).

In line with the Scholastic notion that all syncategorematic terms have the property of qualifying either terms or propositions, Paul of Pergula provides an equally syntactic explanation of the scope of other terms in his tract on composite and divided senses. It is the syntactic location of a given term which is always responsible for its scope: for instance, he says with respect to relative clauses with the pronoun *qui*, that they must be interpreted as *de dicto* or composite when they interrupt the main clause or matrix, but they must be interpreted as *de re* or divided when they are extraposed, that is, when they appear after the main clause:
In other words, Paul of Pergula finds that the sentence *Omnis homo qui est prudens est iustus* 'Every man who is wise is just' has a different meaning from the sentence *Omnis homo est iustus qui est prudens* 'Every man is just who is wise'. The first example has the relative clause following its antecedent in an immediate way, and the sense is composite, that is, the relative clause modifies the main clause as a whole. It seems to me that Paul of Pergula thinks of relative clauses much as we think of quantifiers today: the relative clause can include the quantifier, or it can be included in it. When the relative clause has a composite sense it modifies *omnis homo*, that is, it governs the quantifier. The second example, *Omnis homo est iustus qui est prudens*, has the relative clause following the matrix and the sense is divided; the relative modifies the term *homo* alone, and it does not govern the quantifier but is governed by it. Interpreting the whole relative clause as a modality, Paul of Pergula seems to be thinking of these sentences in the same way he thinks of *necesse*, *possibile*, etc. Following Prior's formalization (1952) presented before, the formulas could be extended to cover Scholastic relative clauses in the following way.

\[
O: \text{omnis 'every, all'} \quad A: \text{homo 'man'} \\
Q: \text{qui est prudens 'who is wise'} \quad B: \text{iustus 'just'} \\
\text{Composite sense: } O A (Q \text{ is } B) \\
\text{Divided sense: } Q \ (O A \text{ is } B)
\]

With respect to propositional attitudes or psychological modalities which he calls mental terms (*terminus mentalis*), Paul of Pergula finds that they effect the composite sense when they precede or follow the subordinate clause, and they have the divided sense when they are interposed in the *dictum*. The mental terms he lists are *verum 'true', scio 'know', dubito 'doubt', credo 'believe', imaginor 'imagine', suspicor 'suspect', apparent 'seems':*

\[\text{fit autem sensus compositus cum terminus mentalis praeceedit vel sequitur dictum propositionis; divisus vero cum mediat inter partes illius dicti}.\]

(Paul of Pergula 1961: 154).

I think that we have here a clear antecedent of the opaque and transparent senses discussed by Quine (1960) in connection with propositional attitudes (notice the nature of Pergula's list). Paul of Pergula is telling us that
mental terms can be construed transparently, that is, with a divided sense, or opaquely, that is with a composite sense (see Rivero (1973) for a discussion of this question). He adds that the location of the verb in surface structure determines uniquely the interpretation which should be assigned to a given configuration. If a sentence is of the form *He thought that the white rose was the prettiest one*, the only possible interpretation for Paul is opaque. A sentence such as *The white rose, he thought, was the prettiest one* could only be interpreted transparently.


This paper has presented a discussion of certain aspects of Scholastic logic from a linguistic point of view. Because of their use of Latin in the formulation of their logical theories, and the lack of an artificial language, Schoolmen had to consider at length subtleties of natural language. Therefore their logical treatises are highly linguistic in character. One area which was studied in depth in the late Middle Ages was that of ambiguity. Different kinds of ambiguity were implicitly recognized: ambiguity of terms, discussed in connection with the properties of terms, ambiguity of syntax, and ambiguity of scope. The last two kinds are connected with another typical development of Scholastic logic, the study of syncategorematic terms. The study and explanation of ambiguity in natural language became of such interest to Schoolmen that ambiguous sentences or sophisms (*sophismata*) were discussed for centuries. Sophisms owing their ambiguity to properties of scope were carefully studied and rules for the prediction of such ambiguities were stated by Peter of Spain in his tract on syncategoremata. These rules resemble what a transformationalist would call today surface structure interpretation rules, and deal in a very clear way with the syntactic and semantic properties of syncategorematic terms in Latin, not with their logical properties.

It was a commonly held view that syncategorematic terms had two kinds of scope: they could qualify a sentence (composite sense), or just a part of it (divided sense), meaning either subject or predicate. From a linguistic point of view, one of the most interesting developments of the study of the scope of syncategorematic terms deals with modal words. Modal adverbs such as *necessarily* and *possibly* were, in line with the general theory, assigned two kinds of scope: they could be understood as qualifying the whole proposition, or just a part of it. For instance, Schoolmen felt that a sentence modified by the Latin adverbial corresponding to *necessarily* was ambiguous, one reading being equivalent to *It is necessary that* ..., as in *It is necessary that Socrates win*, the other to *It is necessary for ... to* ..., as in *It is necessary
for Socrates to win. It is implicit in the discussions of that period that Schoolmen thought that categorematic terms with a modal character such as possible in *It is possible that* . . . had the same properties of scope as the corresponding modal adverbials (possibly). In other words, Schoolmen assigned two readings to the Latin equivalent of *Possibly, Socrates wins*. These two readings can be paraphrased by *It is possible that Socrates will win* and *It is possible for Socrates to win*. The same ambiguity is found in the Latin structure where *possibile* 'possible' functions as the predicate of a main clause with an embedded infinitive clause as complement as in *Possibile est Socratem currere*, which could be glossed as either 'It is possible that Socrates run' or 'It is possible for Socrates to run'. In summary, Schoolmen treated modal adverbials and modal adjectives as if they had the same underlying origin, as if they were derived from a unique element in underlying structure.

The answers to the question what is a modal proposition *de dicto* (or composite) and a modal proposition *de re* (or divided) reveal two different tendencies. A first group of logicians tries to answer this question by considering the meaning of sentences alone, by not taking into account the particularities of Latin syntax. With a modern terminology, I could say that this first group treats the scope of modality as an aspect of underlying structure. However, this attempt is not completely successful and we find indications, especially in Sherwood's writings, to the effect that the location of the modal term in surface structure affected the interpretation of Latin sentences. The second group of logicians classify modal propositions according to the location, within the sentence, of the modality. The positioning of the modal term, they feel, predicts the interpretation of a sentence in its modal force. This second group would be considered in modern dress as one that proposes that the scope of modes is determined by aspects of surface structure alone, and not of underlying structure. They present surface structure interpretation rules which mechanically assign scope to modalities.

It is easy to see a certain parallelism between these two tendencies in the *logica moderna* of the Schoolmen and the two tendencies within transformational grammar known as generative semantics and interpretive semantics. The generative semanticists of the Middle Ages emphasized the role of underlying structure in the assignment of scope, but could not ignore the contribution of surface aspects to the interpretation of their examples. The interpretive semanticists of the Middle Ages concentrated on surface structure alone in the interpretation of Latin sentences, when they had to deal with aspects of scope.
This paper presents a discussion of some aspects Scholastic logic heavily influenced by the grammar of Latin, and, as a result, of clear interest to the linguist.

In Scholastic times syncategorematic terms, that is, those which in a sentence did not function as either subject or predicate, were assigned two kinds of scope: narrow and wide. Divergent views developed with respect to the scope of syncategoremata of modality, such as possibly and necessarily. A first group of logicians including William of Sherwood, Peter of Spain, and Albert the Great felt that modal propositions had to be classified according to their sense, even if their (surface) syntactic structure was misleading as to their logical force. A second group of logicians including Thomas Aquinas in the XIII century, and such a late Schoolman as Paul of Pergula (XV) felt that the position of the modality in what we might term the surface structure of the sentence influenced the assignment of scope in an automatic way, and they provided surface structure interpretation rules to predict the meaning of sentences with modal words.

This article is an attempt to show how relevant to linguistics are the discussions of the subtleties of Latin which are usually found in logical tracts of the Scholastic period.

REFERENCES

I. Sources.

II. Secondary works.


