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ΤΩΙ VS *ΤΩΝ* IN *PRIOR ANALYTICS* 1.1–22*

Aristotle's syllogistic, developed in *Prior Analytics* 1.1–22, contains an abundance of constructions of the type *τὸ A τινὶ* (or *οὐδενὶ* or *μηδενὶ*) *τῷ B ὑπάρχει*. In some passages, however, several MSS have alternative constructions of the type *τὸ A τινὶ* (or *οὐδενὶ* or *μηδενὶ*) *τῶν B ὑπάρχει*, using the genitive plural article *τῶν* instead of the dative singular article *τῷ*. The passages in which there is strong MS evidence for these alternative constructions display significant similarities: most of them are concerned either with conversions or with perfect syllogisms. This suggests that the alternative genitive plural constructions serve a certain function in Aristotle's syllogistic. We shall argue that they are closely connected with the semantic interpretation of the syllogistic indicated by what is known as Aristotle's *dictum de omni et de nullo*. They do not pertain, that is, to the syllogistic viewed as a deductive system of categorical propositions. Rather, they belong to an underlying semantics which justifies the deduction rules (conversions and perfect syllogisms) of that deductive system.

I. *ΤΟ A ΤΙΝΙ (ΟΥΔΕΝΙ, ΜΗΔΕΝΙ) ΤΩΝ B ΥΠΑΡΧΕΙ*

We shall consider constructions consisting of the verb *ὑπάρχειν* and a dative object of the form 'dative pronoun + *τῶν* + a single letter'. The MSS often vary between these genitive plural constructions and the corresponding more common dative singular constructions. In some passages there is only weak MS evidence for the genitive plural constructions; in other passages, on the other hand, they are attested by a significant majority of the MSS. In what follows, we shall focus on those instances of genitive plural constructions attested by at least four of the five most important MSS of the *Analytics* (either by the original hand or by a secondary hand in the MS).

There are altogether thirty-three such instances in *Prior Analytics* 1.1–22.[1] In all of them, the dative pronoun is either the indefinite pronoun *τινι* or the negative pronoun *οὐδενί* or *μηδενί*. None contains the dative pronoun *παντί*, although Aristotle often uses dative singular constructions of the type *τὸ A παντὶ τῷ B ὑπάρχει*. Part of the reason for this may be a general restriction on what is called the partitive use of the genitive case in ancient Greek: while phrases like *τὶς* (or *οὐδεὶς*) *τῶν ἀνθρώπων* are typical examples of common usage, this is not the case for phrases like *πᾶς* (or *πάντες*) *τῶν ἀνθρώπων*.

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[1] These are: 1.2.25a15 (twice), 25a16 (*τῶν B*), 25a21 (twice), 25a22, 25a23 (*τῶν B*), 1.10.30b16 (*οὐδενὶ τῶν B*), 31a9 (twice), 1.11.31a41 (*τῶν Γ*), 31b1 (twice), 1.14.33a14, 33a15, 33a27, 1.15.35a8, 1.16.36a34, 36a36 (*τῶν Γ*), 36a38 (*οὐδενὶ τῶν Γ*), 1.17.36b36, 37a5, 37a13, 37a14, 37a18, 1.19.38a22, 38a24 (twice), 1.20.39a18 (*τῶν B*), 39a19, 39a34 (*τῶν B*), 39a35 (*τῶν B ἐνδέχεται*), 1.21.39b14. The Bekker page numbers refer to the line in which the genitive plural article occurs. For further explanation of this list, cf. the Appendix at the end of this paper.

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Most of the thirty-three instances occur in one of two well-defined contexts: either in the discussion of the (in)validity of a conversion rule or in the formulation of a perfect syllogism. There are twelve instances in the group determined by the first kind of context. They occur either in the discussion of assertoric conversions in Chapter 1.2 or in the discussion of the invalid conversion of universal negative two-sided possibility (that is, contingency) propositions in Chapter 1.17.[2] The group determined by the second kind of context contains fourteen instances. They occur either in the statement of the validity of a perfect syllogism (one instance[3]) or in the application of a perfect syllogism within the proof of an imperfect syllogism (thirteen instances[4]). The instances of the second group tend to occur exactly in the minor premiss and the conclusion of the perfect syllogism in question.[5]

There remain seven instances which do not fall into either group. Five of them are none the less closely related to perfect syllogisms: they occur in the formulation of a proposition that is transformed into another proposition, which is then used as a premiss of a perfect syllogism.[6] These five instances might thus be counted as belonging to the second group. If so, then apart from two exceptions,[7] thirty-one out

[2] Cf. the seven instances from 1.2 and the five instances from 1.17 mentioned in the previous note.

[3] This occurs in the formulation of the conclusion of the perfect syllogism Ferio QQQ (1.14.33a27). In this paper, the letter Q indicates two-sided possibility (that is, contingency), M one-sided possibility, N necessity, and X assertoric (that is, non-modalized) propositions.

[4] These occur in the conclusion of Celarent NXN within the proof of Camestres XNN (1.10.30b16), in the minor premiss and conclusion of Ferio NXN within the proof of Festino NXN (1.10.31a9, twice), in the major and minor premiss and in the conclusion of Ferio XXX (or Ferio XNX) within the proof of Ferison XNX (1.11.31a41 and twice in 31b1), in the conclusion of Celarent NXN within the proof of Ferio NQX (1.16.36a38), in the minor premiss and conclusion of Ferio NXN within the proof of Cesare NQX (1.19.38a24, twice), in the minor premiss and conclusion of Darii QQQ within the proof of Darapti QQQ (1.20.39a18 and 39a19), in the minor premiss and conclusion of Darii QQQ within the proof of Datisi QQQ (1.20.39a34 and 39a35).

[5] There are four exceptions. In one of them, the genitive plural construction occurs in the major premiss as well as in the minor premiss and conclusion (1.11.31a41). In the other three exceptions it occurs only in the conclusion. In two of them, the perfect syllogism in question is Celarent NXN (1.10.30b16, 1.16.36a38). The universal affirmative minor premiss of Celarent NXN must be expressed by means of the pronoun *παντί*, which is usually not compatible with partitive genitive plural phrases. In the remaining passage (1.14.33a27), three of the five major MSS have a genitive plural construction in the minor premiss as well as in the conclusion (33a26, cf. the Appendix at the end of this paper).

[6] Two of them occur in the formulation of the two premisses of the premiss pair ee-1-QQ (1.14.33a14 and 33a15). Aristotle indicates a deduction of a universal affirmative Q conclusion from ee-1-QQ via the perfect syllogism Barbara QQQ by turning the two universal negative Q premisses into universal affirmative Q propositions (cf. Alexander *in APr.* 168.7–20 and the plural *ἀντιστρεφομένων* in 33a16). A further two instances occur in the formulation of the major premiss and the desired conclusion of Ferio NQX (1.16.36a34, 36a36). This syllogism is proven by *reductio ad absurdum* via the perfect syllogism Celarent NXN. The major premiss of Ferio NQX is converted, and the result of the conversion is used as the major premiss of Celarent NXN. The contradictory of the desired conclusion is used as the minor premiss of Celarent NXN. The conclusion of this application of Celarent NXN is also formulated in terms of a genitive plural construction (36a38). The fifth instance occurs in the formulation of the desired conclusion of Cesare NQX (1.19.38a22). The contradictory of the desired conclusion is used as the minor premiss of the perfect syllogism Ferio NXN in Aristotle's indirect proof of Cesare NQX. The minor premiss and the conclusion of this application of Ferio NXN are also formulated in terms of a genitive plural construction (38a24).

[7] These occur in the formulation of the minor premiss of aea-1-XQM (1.15.35a8), and in the formulation of the conclusion of Darii XQM within the proof of Darapti XQM (1.21.39b14). Neither of them is connected to a perfect syllogism in any obvious way.

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of thirty-three instances (94%) would belong to one of the two groups. Otherwise only twenty-six instances (79%) would belong to one of the two groups.

At any rate, the large majority of the thirty-three genitive plural constructions occurs in one of two specific contexts, either in the discussion of conversions or in the formulation of perfect syllogisms. This suggests that they do not occur randomly, and that they are not entirely synonymous with the corresponding dative singular constructions.[8] To be sure, I am not going to propose an explanation of why the genitive plural constructions occur exactly where they do. For in many passages concerned with conversions there is no or only little MS evidence for a genitive plural construction. The same is true of a lot of passages containing the statement or an application of a perfect syllogism. I am not in a position to offer an explanation of why the genitive plural constructions do not occur in these passages; nor is it evident whether such an explanation is possible at all. None the less, the data mentioned so far strongly suggest that in those passages where the genitive plural constructions do occur, they are of some significance.

In order to see what that significance may be, it may be helpful to have a look at other, related constructions containing the genitive plural article *τῶν*. In *Prior Analytics* 1.1–22 there are four passages containing such related genitive plural constructions: the *dictum de omni* in Chapter 1.1, the justification of the conversion of assertoric universal negative propositions in Chapter 1.2, the ecthetic proofs of assertoric third figure syllogisms in Chapter 1.6, and the justification of the perfect syllogisms Barbara NXN and Celarent NXN in Chapter 1.9. Each of the following four sections deals with one of these passages.

II. *DICTUM DE OMNI*

Aristotle's *dictum de omni* may be viewed as a characterization of the meaning, or the semantics, of assertoric universal affirmative propositions (A propositions):

λέγομεν δὲ τὸ κατὰ παντὸς κατηγορεῖσθαι ὅταν μηδὲν ᾖ λαβεῖν τῶν τοῦ ὑποκειμένου καθ' οὗ θάτερον οὐ λεχθήσεται (*APr.* 1.1.24b28–30)

Although the genitive plural article in this passage is attested only by a single MS of the *Analytics* (Urbinas 35), it is accepted by many editors before Ross.[9] On the other hand, some commentators suggest excising not only the genitive plural article but also the phrase *τοῦ ὑποκειμένου*, even though this is found in all MSS.[10]

[8] A similar conclusion is proposed by R. Smith, *Aristotle: Prior Analytics* (Indianapolis, Cambridge, 1989), 236.

[9] Editors who accept the phrase *τῶν τοῦ ὑποκειμένου* include I. Bekker, *Aristoteles graece. Volumen prius* (Berlin, 1831); T. Waitz, *Aristotelis organon graece I* (Leipzig, 1844); H. Tredennick, *Aristotle: The Organon I. The Categories, On Interpretation, Prior Analytics* (Cambridge, MA, 1938, Loeb Classical Library). Commentators who accept that phrase include H. Maier, *Die Syllogistik des Aristoteles II.1* (Tübingen, 1900), 13, n. 1; T. Ebert, 'Was ist ein vollkommener Syllogismus des Aristoteles?', *Archiv für Geschichte der Philosophie* 77 (1995), 221–47, at 230–1, n. 11; M. Wolff, 'Prinzipien und expositorische Beweise in Aristoteles' Syllogistik', *Philosophiegeschichte und logische Analyse* 1 (1998), 131–69, at 162; M. Drechsler, *Interpretationen der Beweismethoden in der Syllogistik des Aristoteles* (Frankfurt am Main, 2005), 286.

[10] For instance, M.Wallies, 'Zur Textgeschichte der Ersten Analytik', *Rheinisches Museum für klassische Philologie* 72 (1917/18), 626–32, at 626–7; D. Ross, *Aristotle's Prior and Posterior Analytics* (Oxford, 1949), 292; J. Barnes, *Truth, etc. Six Lectures on Ancient Logic* (Oxford, 2007), 387, n. 34.

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The general idea of the *dictum de omni* remains more or less unaffected by these textual issues. If the phrase *τῶν τοῦ ὑποκειμένου* is accepted, it introduces the idea of a plurality of items associated with the subject term. The *dictum* may then be taken to state that the predicate term is said (*λεχθήσεται*) of every member of that plurality. The same interpretation of the *dictum* may reasonably be adopted when the phrase *τῶν τοῦ ὑποκειμένου*, or only the genitive plural article in it, is rejected. In any case, the subject term is associated with a plurality of items which serves as the relevant domain of quantification.

Aristotle does not explain the nature of the items which are the members of the plurality associated with the subject term. Nor does he specify the requirements for such an item to be a member of that plurality, or the requirements for the predicate term to be said of it. According to what might be called the canonical set-theoretic interpretation, those items are individuals referred to by singular terms. The subject and predicate term, on the other hand, are regarded as general terms whose semantic value is a set of individuals. In this case, the plurality associated with a term may be identified with the set of individuals which is its semantic value: the plurality associated with a term is its semantic value. The members of that plurality, on the other hand, cannot serve as the semantic value of argument terms of categorical propositions.

According to other interpretations of the *dictum*, the members of the plurality associated with a term can themselves serve as the semantic value of argument terms of categorical propositions.[11] That is, it is not the case that the members of the relevant domain of quantification are individuals (the semantic values of singular terms) while the argument terms of categorical propositions are general terms whose semantic value is a set of individuals. In general, the plurality associated with a term will not be its semantic value. Rather, that plurality is a subclass of the domain of possible semantic values of argument terms of categorical propositions – whatever these semantic values are taken to be. In this case, the distinction between a term and its semantic value becomes of minor importance, a distinction which at any rate is not explicitly drawn by Aristotle in the *Prior Analytics*. Thus, non-set-theoretic interpretations may neglect that distinction, or they may take every term to be its own semantic value. In what follows, we shall distinguish between a term and its semantic value, as this distinction is of importance in some interpretations of the syllogistic such as the canonical set-theoretic interpretation. However, we shall leave it open what that semantic value is in non-set-theoretic interpretations.

Let us now consider the two predicative relations used in the *dictum de omni*. If the *dictum* is expressed by the formula 'the predicate term is said of every member of the plurality associated with the subject term', the one relation is indicated by the phrase 'is said of' and the other by the phrase 'member of the plurality associated with the subject term'. On the semantic level, both relations obtain between the semantic value of an argument term of a categorical proposition on the one hand and a member of the plurality associated with such a term on the other. In the set-theoretic interpre-

[11] Authors adopting such an interpretation of the *dictum de omni* include H. Maier (n. 9), 13, n. 1; P. Stekeler-Weithofer, *Grundprobleme der Logik* (Berlin, 1986), 76; M. Mignucci, 'Aristotle's Theory of Predication', in I. Angelelli and M. Cerezo (edd.), *Studies in the History of Logic* (Berlin, 1996), 1–20, at 4–5; M. Malink, 'A Reconstruction of Aristotle's Modal Syllogistic', *History and Philosophy of Logic* 27 (2006), 95–141, at 106–8. Such an interpretation has also been suggested by M. Frede (reported by J. Barnes [n. 10], 406, n. 57).

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tation, both relations are specified as the relation of membership obtaining between a set of individuals and an individual.

Non-set-theoretic interpretations, on the other hand, are open to several ways of specifying the two predicative relations. Whichever way of specifying them is adopted, it is reasonable to assume that they are the same. For instance, they may both be specified as a primitive part-whole relation thought of as a sort of assertoric universal affirmation. In this case, the plurality associated with a term may be taken to be the set of all parts of its semantic value. Alternatively, the two relations may be specified as a relation of mereological 'overlapping' (or as a relation of connection) thought of as a sort of assertoric particular affirmation. In this case, the plurality associated with a term may be taken to be the set of all items with which its semantic value overlaps (or is connected).

For our purposes we need not settle on a specific interpretation of the *dictum de omni*. Whether we adopt the set-theoretic interpretation or one of the non-set-theoretic interpretations, the *dictum de omni* can be formulated as follows: every member of the plurality associated with the subject term B is a member of the plurality associated with the predicate term A. In other words, every member of the plurality *τῶν* B is a member of the plurality *τῶν* A. To put it more formally in terms of classical quantifier logic: for every x, if x is a member of the plurality *τῶν* B, then x is a member of the plurality *τῶν* A.

This condition is reflexive, since every member of the plurality *τῶν* A is a member of the plurality *τῶν* A. In the same way, the condition is transitive.[12] Inasmuch as the *dictum de omni* determines the semantics of A propositions, its logical form guarantees that A propositions, thought of as binary relations between terms, are reflexive and transitive in the semantics. Thus, the semantics indicated by the *dictum de omni* determines logical properties of categorical propositions. In what follows, that semantics will be referred to as the *dictum*-semantics.

III. CONVERSIONS

We now turn to Aristotle's justification of the conversion of E propositions. In addition to constructions of the type *οὐδενὶ τῶν* A *ὑπάρχειν*, this passage contains the construction *τὸ γὰρ* Γ *τῶν* B *τί ἐστιν*:

εἰ οὖν μηδενὶ τῶν B *τὸ* A *ὑπάρχει, οὐδὲ τῶν* A *οὐδενὶ ὑπάρξει τὸ* B*· εἰ γάρ τινι, οἷον τῷ* Γ*, οὐκ ἀληθὲς ἔσται τὸ μηδενὶ τῶν* B *τὸ* A *ὑπάρχειν· τὸ γὰρ* Γ *τῶν* B *τί ἐστιν.*
(*APr.* 1.2.25a15–7)

According to Alexander (*in APr.* 31.27–32.3), this justification was regarded as circular by some ancient commentators: Aristotle was taken to justify the conversion of E propositions by means of the conversion of I propositions and, a few lines later in 25a20–2, vice versa. Alexander (*in APr.* 32.8–11) defends Aristotle by arguing that his justification of the conversion of E propositions does not rely on the conversion of I propositions but on the *dictum de omni et de nullo*.

The *dictum de nullo* may be viewed as a characterization of the semantics of E propositions. Aristotle (*APr.* 1.1.24b30) confines himself to saying that the *dictum de nullo* is similar to the *dictum de omni*. Presumably he had in mind that the *dictum de nullo* is obtained by deleting the negation *οὐ* at the end of the formulation of the

[12] That is to say, if every member of *τῶν* Γ is a member of *τῶν* B and every member of *τῶν* B is a member of *τῶν* A, then every member of *τῶν* Γ is a member of *τῶν* A.

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dictum de omni in 24b28–30.[13] We took the *dictum de omni* to be tantamount to the condition that every member of the plurality associated with the subject term be a member of the plurality associated with the predicate term. Consequently, the *dictum de nullo* is tantamount to the condition that *no* member of the plurality associated with the subject term be a member of the plurality associated with the predicate term. In other words, no member of the plurality *τῶν B* is a member of the plurality *τῶν A*.

This condition is symmetric[14] and so is its contradictory. Thus, the conversion of E propositions is valid in the *dictum*-semantics. A central feature of that semantics, I submit, is the appeal to pluralities associated with terms. These pluralities are referred to by genitive plural phrases like *τῶν A*. Aristotle's justification of the conversion of E propositions contains four such genitive plural phrases. I suggest that these serve the function of indicating that the justification is carried out within the *dictum*-semantics. Aristotle's indirect justification, that is, does not appeal to the convertibility of I propositions but to the symmetry (or convertibility) of the contradictory of the *dictum de nullo*. It is true that this contradictory may happen to be the *dictum de aliquo*, which characterizes the semantics of categorical I propositions: some member of the plurality associated with the subject term is a member of the plurality associated with the predicate term. However, the *dictum de aliquo* must not be identified with a categorical I proposition, nor is it relevant to Aristotle's justification of the conversion of E propositions that the contradictory of the *dictum de nullo* is the *dictum de aliquo*.

Aristotle's standard expressions for categorical I propositions are dative singular constructions of the type *τὸ A τινὶ τῷ B ὑπάρχει*. It is worth noting that the phrase *τινὶ τῷ B* does not constitute a natural syntactic unit in ancient Greek. The quantifying pronoun *πᾶς*, on the other hand, does yield a natural syntactic unit when it is combined with nominal phrases containing a singular definite article. In such contexts, *πᾶς* can often be rendered into English as 'the whole': *πᾶσα ἡ πόλις* – 'the whole city'.[15] However, the indefinite pronoun *τις* and the negative pronoun *οὐδείς* do not typically admit such constructions: phrases like *τὶς ἡ πόλις* (*τὶς* being the indefinite, not the interrogative pronoun) or *οὐδεμία ἡ πόλις* are not meaningful syntactic units. This corresponds to the fact that in English we may say 'the whole city' but not 'the some city' or 'the none city'.

The dative singular article in constructions of the type *τὸ A τινὶ τῷ B ὑπάρχει* may be regarded as an artificial dummy expression combined with letters like *A* and *B* in order to refer to syllogistic terms. Specifically, the article may be regarded as a means of indicating the morphological case, and thereby the syntactic function, of syllogistic terms. In such contexts, syllogistic terms are referred to by phrases like *τὸ A* and *τῷ B*, not by single letters like *A* and *B*.

In *Prior Analytics* 1.1, categorical propositions are characterized as affirmations or denials possessing a tripartite syntax: they consist of two argument terms and a copula (*τὸ εἶναι ἢ μὴ εἶναι*).[16] In *De Interpretatione* Aristotle points out that

[13] Authors holding this view include Alexander *in APr.* 25.17–9, 32.20–1, 55.5–7; Ebert (n. 9), 231; Barnes (n. 10), 390.

[14] That is to say, if no member of *τῶν B* is a member of *τῶν A*, then no member of *τῶν A* is a member of *τῶν B*.

[15] Cf. R. Kühner and B. Gerth, *Ausführliche Grammatik der griechischen Sprache. Zweiter Teil: Satzlehre. Erster Band*[3] (Hannover and Leipzig, 1898), 633, §465.6c.

[16] *APr.* 1.1.24a16–7 and 24b16–8. Categorical propositions are a species of simple apophantic sentences introduced in *Int.* 5.17a20–6; cf. Alexander *in APr.* 10.13–5, 11.6–8, and Barnes (n. 10), 134–5.

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quantifying pronouns such as *πᾶς* or *οὐδείς* additionally signify (*προσσημαίνειν*) nothing other than that the affirmation or denial is universal.[17] The verb *προσσημαίνειν* is typically used to describe syncategorematic expressions that do not signify (*σημαίνειν*) anything on their own. For instance, the copula additionally signifies a combination that cannot be conceived without the things combined.[18] Similarly, verbs additionally signify temporal features such as present or past tense.[19] In the same way, quantifying pronouns additionally signify quantitative features. They serve to distinguish between copulae of different quantity but are not independent constituents in the tripartite syntax of categorical propositions.[20] Thus, a categorical proposition such as *τὸ A τινὶ τῷ B ὑπάρχει* consists of three parts: two terms indicated by *τὸ A* and *τῷ B* and a copula indicated by *… τινὶ … ὑπάρχει*.

This syntactic structure of categorical propositions does not contain an explicit reference to pluralities associated with terms. The syntactic structure of genitive plural constructions such as *τὸ A τινὶ τῶν B ὑπάρχει*, on the other hand, does. Unlike the phrase *τινὶ τῷ B*, the phrase *τινὶ τῶν B* constitutes a natural syntactic unit in ancient Greek (a so-called partitive genitive construction), referring to some unspecified member of the plurality *τῶν B*. The genitive plural article in the phrase *τινὶ τῶν B* is not an artificial dummy expression. Nor does the phrase *τῶν B* indicate a syllogistic term; rather, it indicates a plurality of items associated with a term. Accordingly, the indefinite pronoun *τινὶ* is not an integrated part of the copula of categorical propositions; rather, it is an independent syntactic constituent of Greek natural language governing the complex phrase *τινὶ τῶν B*. Thus, the syntactic structure of the genitive plural construction *τὸ A τινὶ τῶν B ὑπάρχει* consists of three parts: a nominative subject *τὸ A*, a dative object *τινὶ τῶν B*, and a finite verb *… / … ὑπάρχει*.

This finite verb does not indicate the assertoric particular affirmative copula indicated by *… τινὶ … ὑπάρχει*. Rather, it indicates a predicative relation within the *dictum*-semantics; for the dative object refers to a member of the plurality associated with a term. More specifically, the finite verb may reasonably be taken to indicate that the item referred to by the dative object is a member of the plurality associated with the term referred to by the nominative subject – just like the verb *λέγεσθαι* in the *dictum de omni* in 24b30. If this is correct, the verb *… / … ὑπάρχει* is tantamount to the construction *τὸ γὰρ Γ τῶν B τί ἐστιν* in Aristotle's justification of the conversion of E propositions.

As mentioned earlier, genitive plural constructions of the type *τὸ A τινὶ* (or *οὐδενὶ* or *μηδενὶ*) *τῶν B ὑπάρχει* occur frequently in Aristotle's discussions of conversions.[21] The first such passage is the justification of the conversion of E propositions. The next is the justification of the conversion of I propositions in 1.2.1.25a20–2. Again, the genitive plural articles may be taken to indicate that this justification is carried out within the *dictum*-semantics rather than at the level of categorical propositions. Thus, the justification may be seen to rely on the symmetry of the

[17] *Int.* 10.20a12–4.
[18] *Int.* 3.16b22–5.
[19] *Int.* 3.16b6–18, 10.19b14, *Poet.* 20.1457a17–8.
[20] Cf. C.W.A. Whitaker, *Aristotle's De Interpretatione. Contradiction and Dialectic* (Oxford, 1996), 144–5.
[21] More precisely, in the passages mentioned in n. 2: 1.2.25a15 (twice), 25a16 (*τῶν B*), 25a21 (twice), 25a22, 25a23 (*τῶν B*), 1.17.36b36, 37a5, 37a13, 37a14, 37a18.

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contradictory of the *dictum de aliquo* – just as the justification of the conversion of E propositions relies on the symmetry of the contradictory of the *dictum de nullo*.

By contrast, the justification of the conversion (*per accidens*) of A propositions in 1.2.25a17–9 does not contain genitive plural constructions. More precisely, it does not contain genitive plural constructions attested by at least four of the five major MSS of the *Analytics*.[22] Instead, it contains dative singular constructions of the type *τὸ A παντὶ* (or *τινὶ* or *οὐδενὶ*) *τῷ B ὑπάρχει*. These may be taken to indicate that the justification is carried out at the level of categorical propositions rather than within the *dictum*-semantics. That is to say, the justification relies on the conversion of E propositions, which was established in 25a15–7, rather than on the symmetry of the *dictum de aliquo* or *dictum de nullo*. Specifically, the justification may be understood as an indirect deduction starting with the premiss *A*a*B* and with the assumption of the contradictory of the desired conclusion, that is, with *B*e*A*. By conversion of categorical E propositions, we deduce *A*e*B*. Since *A*e*B* is contrary to the premiss *A*a*B*, the indirect deduction can be concluded.

This indirect deduction presupposes that A and E propositions are contrary to each other. Aristotle repeatedly states that contrariety;[23] he states that A and E propositions cannot both be true at the same time.[24] In order for this requirement to be valid in the *dictum*-semantics, the *dictum de omni* must be contrary to the *dictum de nullo* for any pair of argument terms. According to the account of the *dictum de omni et de nullo* in terms of classical quantifier logic proposed above, this amounts to the requirement that for every term *A*, the plurality associated with *A* have at least one member.[25]

This requirement can be met in different ways depending on how the condition of being a member of the plurality associated with a term is specified. In the set-theoretic semantics, this condition is specified as being a member of the set which is the semantic value of the term under consideration. Thus, the semantic value of any term is required to have at least one member. This specific requirement is often referred to as the presupposition of existential import. On the other hand, if being a member of the plurality associated with a term *A* is understood as being a part of the semantic value of *A*, then the semantic value of any term is required to have at least one part. This requirement is met, for instance, if the part-whole relation is taken to be reflexive. Or if being a member of the plurality associated with *A* is understood as overlapping (or being connected) with the semantic value of *A*, then the semantic value of any term is required to overlap (or to be connected) with at least one item.

In any event, the justification of the conversion of A propositions presupposes that the plurality associated with any term not be empty. Let us call this the generalized presupposition of existential import (in order to distinguish it from its set-theoretic species). The justifications of the other two valid assertoric conversions, on the other hand, do not rely on that presupposition. They rely solely on the *dictum de nullo et de aliquo*, whose logical form guarantees its symmetry regardless of how the condition of being a member of the plurality associated with a term is specified. This difference

[22] Cf. the Appendix at the end of this paper.
[23] *APr.* 2.8.59b8–11, 2.15.63b28–30, *Int.* 7.17b20–3, 10.20a16–7.
[24] *Int.* 7.17b20–3, 10.20a16–8.
[25] Suppose that the plurality associated with *A* has no members. Then according to the principles of classical quantifier logic, both the *dictum de omni* and the *dictum de nullo* are true for any predicate term *B*: every and no member of the plurality associated with *A* is a member of the plurality associated with *B*.

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may be part of the reason why the latter two justifications contain genitive plural constructions while the former does not. The justification of the conversion of A propositions is not carried out within the *dictum*-semantics. This allows Aristotle to avoid any need to explain why the *dictum de omni* is contrary to the contradictory of the *dictum de aliquo*. Instead, the conversion of A propositions is stipulated at the level of categorical propositions by the assumption that the two universal assertoric propositions are contrary to each other.

A similar point can, I think, be made about Aristotle's discussion of modal conversions in *Prior Analytics* 1.3. This chapter does not contain any genitive plural constructions attested by at least four of the five major MSS. Accordingly, I do not take Aristotle to justify his modal conversions within the *dictum*-semantics (or within a modalized version of it). After all, chapters 1.1–3 do not contain any reference to modal *dicta* upon which such a justification could be based. Nor is it straightforward to specify modal *dicta* that would account both for Aristotle's modal conversions and for his other statements of (in)validity in the modal syllogistic. Thus, Aristotle may be taken to stipulate and make plausible rather than justify or prove his statements about modal conversions in Chapter 1.3.[26]

On the other hand, Aristotle's rejection of the conversion of universal negative two-sided possibility propositions (QE propositions) in *Prior Analytics* 1.17 contains instances of genitive plural constructions attested by at least four of the five major MSS. Most of these instances occur in constructions of the type *τὸ A τινὶ τῶν B ἐξ ἀνάγκης (οὐχ) ὑπάρχει*, which are supposed to constitute something contrary to QE propositions in Chapter 1.17.[27] Aristotle may have had several reasons for using this kind of genitive plural construction. He might have wished to make clear an implication of the semantics of QE propositions: for every member of the plurality associated with the subject term, the predicate term must not belong, or fail to belong, to it of necessity. Or he might have wished to distinguish constructions of the type *τὸ A τινὶ τῶν B ἐξ ἀνάγκης ὑπάρχει* from the corresponding standard dative singular constructions, which express categorical particular affirmative necessity propositions (NI propositions). For, contrary to expectations, NI propositions are not contrary to QE propositions in Aristotle's modal syllogistic.[28]

However that may be, the aim of this paper is not systematically to explain every single instance of genitive plural and dative singular constructions in the *Prior Analytics*. Rather, I wish to offer a general explanation of the obvious concentration of genitive plural constructions in Aristotle's discussion of conversions: they serve to indicate that the (in)validity of the conversions under consideration is justified within the *dictum*-semantics.

IV. ECTHESIS

In the assertoric syllogistic (*Prior Analytics* 1.1–7), ecthesis is only mentioned as an alternative method of proving the third figure syllogisms Darapti, Disamis, Datisi and

[26] A similar view is held by W. Wieland, 'Die aristotelische Theorie der Konversion von Modalaussagen', *Phronesis* 25 (1980), 109–16, at 111.

[27] 1.17.37a5, 37a13, 37a14, 37a18.

[28] Otherwise, Camestres NQX would be indirectly provable via Darii NXN in the same way Cesare NQX is proven via Ferio NXN in *APr.* 1.19.38a21–5 (cf. also the proof of Celarent NQX in 1.16.36a7–15). This would contradict Aristotle's statement of the inconcludence of the premiss pair of Camestres NQX (1.19.38a26–b4). Similarly, the mood eao-2-QNX would be provable via Darapti NXN, contradicting the inconcludence of ea-2-QN (1.19.38b4–5).

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Bocardo.[29] The most characteristic feature of ecthesis is the introduction, the setting out, of a new term:

ἂν ληφθῇ τι τῶν Σ οἷον τὸ N	*APr.* 1.6.28a24–5
ἐὰν ληφθῇ τι τῶν Σ	*APr.* 1.6.28b21

These genitive plural constructions consist of the verb *λαμβάνειν* and an accusative object of the form 'pronoun + *τῶν* + a single letter'.[30] They are similar to the genitive plural construction in the *dictum de omni* in 24b29: *ὅταν μηδὲν ᾖ λαβεῖν τῶν τοῦ ὑποκειμένου* (provided that this phrase is accepted). Accordingly, the step of setting out may be taken to be justified by the *dictum de omni et de nullo*.[31] Moreover, the phrase *οἷον τὸ N* in the first of the two passages from 1.6 just quoted is similar to the phrase *οἷον τῷ Γ* in Aristotle's justification of the conversion of E propositions in 25a16. Accordingly, we may follow Alexander (*in APr.* 32.28–34) in regarding this justification as an ecthetic proof justified by the *dictum de omni et de nullo*. Similarly, the other ecthetic proofs in the assertoric syllogistic may be taken to be based on the two *dicta* specifying the semantics of the two particular propositions: an I (or O) proposition is true if and only if some member of the plurality associated with the subject term is (or is not) a member of the plurality associated with the predicate term. We shall refer to the right hand side of this equivalence as the *dictum de aliquo* (or *de aliquo non*) while the whole equivalence will be referred to as the ecthetic principle for assertoric particular affirmation (or negation). Let me sketch how the ecthetic principle for assertoric particular affirmation can be used to interpret Aristotle's ecthetic proof of Darapti (Π is the major term, P the minor term and Σ the middle term):

εἰ γὰρ ἄμφω [Π and P] *παντὶ τῷ Σ ὑπάρχει, ἂν ληφθῇ τι τῶν Σ οἷον τὸ N, τούτῳ καὶ τὸ Π καὶ τὸ P ὑπάρξει, ὥστε τινὶ τῷ P τὸ Π ὑπάρξει.* (*APr.* 1.6.28a24–6)

Aristotle begins by stating the major and minor premiss of Darapti, two categorical A propositions formulated in terms of a dative singular construction. He goes on to set out a member of the plurality associated with the middle term Σ, and labels it N. This step is justified by what I have called the generalized presupposition of existential import, according to which the plurality associated with any term must not be empty. Alternatively, but equivalently, the step may be justified by converting one of the two A premisses to an I proposition, and applying the ecthetic principle for assertoric particular affirmation. The fact that N (that is, according to the terminology employed above, the semantic value of the term N) is a member of the plurality associated with the term Σ is expressed in terms of a genitive plural construction. Thus, this fact pertains to the *dictum*-semantics rather than to the level of categorical propositions.

Aristotle goes on to infer that both the major and the minor term belong (*ὑπάρξει*) to N. Remarkably, the verb *ὑπάρχειν* is not accompanied by a quantifying pronoun here. In the whole assertoric syllogistic (*Prior Analytics* 1.1–7), there are only two

[29] *APr.* 1.6.28a22–6, 28b14–5, 28b20–1.

[30] Several commentators have observed that there is a correlation between ecthetic proofs and genitive plural constructions; for instance, R. Smith, 'What is Aristotelian Ecthesis?', *History and Philosophy of Logic* 3 (1982), 113–27, at 119–20; Smith (n. 8), 236; Ebert (n. 9), 231, n. 11.

[31] Cf. Smith (n. 8), XXV.

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passages where *ὑπάρχειν* is used without a quantifying pronoun:[32] the ecthetic proof of Darapti and the ecthetic proof of Bocardo (which will be discussed in a moment).

As suggested earlier, the syntactic structure of genitive plural constructions of the type *τὸ A τινὶ τῶν B ὑπάρχει* consists of a nominative subject, a dative object and a verb … / … *ὑπάρχειν*. We took this verb to indicate that the item referred to by the dative object is a member of the plurality associated with the term referred to by the nominative subject. Moreover, I suggested that the same applies to the verb *λέγεσθαι* in the *dictum de omni* in 24b30, which is not accompanied by a quantifying pronoun either. It also applies, I submit, to the verb *ὑπάρξει* in the ecthetic proof of Darapti.[33] If so, the phrase *τούτῳ καὶ τὸ Π καὶ τὸ P ὑπάρξει* in this proof amounts to the statement that (the semantic value of the term) *N* is a member of both the plurality associated with the major term and of the plurality associated with the minor term. This statement is justified by virtue of the two *dicta de omni* corresponding to the major and minor premiss of Darapti: every member of the plurality associated with the middle term is a member of the plurality associated with the major or minor term respectively. For (the semantic value of the term) *N* is a member of the plurality associated with the middle term.

Finally, Aristotle concludes the ecthetic proof by inferring the desired conclusion, a categorical I proposition formulated in terms of a dative singular construction. This is justified by the ecthetic principle for assertoric particular affirmation; for some member of the plurality associated with the minor term, namely (the semantic value of the term) *N*, is a member of the plurality associated with the major term. The ecthetic proofs of Datisi and Disamis can, *mutatis mutandis*, be interpreted in the same way as the ecthetic proof of Darapti.

Let me now sketch how the ecthetic principle for assertoric particular negation suggested above can be used to interpret Aristotle's ecthetic proof of Bocardo (again, *Π* is the major and *Σ* the middle term):

δείκνυται δὲ καὶ ἄνευ τῆς ἀπαγωγῆς, ἐὰν ληφθῇ τι τῶν Σ ᾧ τὸ Π μὴ ὑπάρχει.
(*APr.* 1.6.28b20–1)

The verb *ὑπάρχει* is used here without a quantifying pronoun. As in the case of Darapti, we shall take this to indicate membership in the plurality associated with a term. Thus, the item set out (that is, the semantic value of the term set out) is a member of the plurality associated with the middle term *Σ* but not of the plurality associated with the major term *Π*. This is in accordance with the ecthetic principle for assertoric particular negation suggested above. Now, the *dictum de omni* corresponding to the minor premiss of Bocardo implies that the item set out is a member of the plurality associated with the minor term. It follows that some member of the plurality associated with the minor term, namely the item set out, is not a member of the plurality associated with the major term. Thus, the ecthetic principle for assertoric particular negation allows us to infer the desired categorical O conclusion of Bocardo.

[32] Smith (n. 30), 119.

[33] This is supported by the use of *ὑπάρξει* in Aristotle's justification of the conversion of E propositions in 25a15–7. The phrase *οἷον τῷ Γ* in 25a16 is presumably intended to introduce a new dative object for the phrase *ὑπάρξει τὸ B* in 25a15–6. If so, we obtain the phrase *τῷ Γ ὑπάρξει τὸ B*, which lacks a quantifying pronoun. Aristotle seems to take this phrase to imply that (the semantic value of the term) *Γ* is a member of the plurality associated with the term *B* (*τὸ γὰρ Γ τῶν B τί ἐστιν* 25a17).

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As already noted, the only two instances in the assertoric syllogistic of *ὑπάρχειν* without a quantifying pronoun occur in ecthetic proofs. Alexander takes this fact to show that the item set out is an individual referred to by a singular term; he argues that propositions whose subject is a singular term do not admit of quantifying pronouns.[34] I wish to suggest an alternative explanation: the use of bare *ὑπάρχειν* without a quantifying pronoun indicates that ecthetic proofs are carried out within the *dictum*-semantics.[35] A typical feature of the *dictum*-semantics is the appeal to pluralities indicated by genitive plural articles. The occurrences of bare *ὑπάρχειν* in ecthetic proofs may be understood as resulting from genitive plural constructions of the type *τὸ A τινὶ τῶν B* (*οὐχ*) *ὑπάρχει* by substitution of the dative object *τινὶ τῶν B* with an ecthetic term indicated by a phrase like *τῷ Γ*.[36] Dative singular constructions of the type *τὸ A τινὶ τῷ B* (*οὐχ*) *ὑπάρχει*, on the other hand, do not admit such a substitution; for the phrase *τινὶ τῷ B* does not constitute a natural syntactic unit which could, as a whole, be substituted by another phrase.

Some commentators attribute to Aristotle an ecthetic principle according to which an O proposition AoB (with A being the predicate term) is true if and only if there is a Γ such that BaΓ and AeΓ.[37] This principle happens to be valid in the canonical set-theoretic semantics for the assertoric syllogistic.[38] However, the principle does not follow from the ecthetic principle for assertoric particular negation suggested above, and it may fail to be valid in many non-set-theoretic semantics. As far as I can see, there is no evidence of Aristotle endorsing the non-trivial implication from AoB to there being a Γ such that BaΓ and AeΓ in the *Prior Analytics*.

V. PERFECT SYLLOGISMS

One of the cornerstones of Aristotle's modal syllogistic is the validity of the perfect syllogisms Barbara NXN and Celarent NXN: if A belongs with universal affirmative (or negative) necessity to B, and B belongs with assertoric universal affirmation to Γ, then A belongs with universal affirmative (or negative) necessity to Γ. Aristotle's justification of these syllogisms is:

ἐπεὶ γὰρ παντὶ τῷ B ἐξ ἀνάγκης ὑπάρχει ἢ οὐχ ὑπάρχει τὸ A, τὸ δὲ Γ τι τῶν B ἐστί, φανερὸν ὅτι καὶ τῷ Γ ἐξ ἀνάγκης ἔσται θάτερον τούτων. (*APr.* 1.9.30a21–3)

Consider the genitive plural construction *τὸ δὲ Γ τι τῶν B ἐστί*. There is only one more instance of such a construction in *Prior Analytics* 1.1–22, which is found in the justification of the conversion of E propositions in 25a17. In both passages the construction may be taken to indicate membership in the plurality associated with a

[34] Alexander *in APr.* 100.9–14; similarly Smith (n. 30), 119–20.

[35] This suggestion is only meant to apply to the assertoric syllogistic. In the modal syllogistic, bare *ὑπάρχειν* is sometimes used to express standard categorical propositions; for instance 1.9.30a18–20, 1.10.30b11.

[36] Such a substitution may be found in Aristotle's justification of the conversion of E propositions in 25a15–7 (cf. n. 33).

[37] Galen *Inst. Log.* 10.8; Alexander *in APr.* 104.3–7; J. Łukasiewicz, *Aristotle's Syllogistic from the Standpoint of Modern Formal Logic* (second edition, Oxford, 1957), 65; G. Patzig, *Aristotle's Theory of the Syllogism* (Dordrecht, 1968), 161; N. Rescher, *Studies in Modality* (Oxford, 1974), 11; R. Smith, 'Completeness of an ecthetic syllogistic', *Notre Dame Journal of Formal Logic* 24 (1983), 224–32, at 226–7; Smith (n. 8), XXIIIf; Barnes (n. 10), 404–5. Some of these commentators mention only the implication from AoB to there being a Γ such that BaΓ and AeΓ. This is the substantive part of the ecthetic principle, as the converse follows via Felapton.

[38] Patzig (n. 37), 161; Smith (n. 37), 228.

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term. In the justification of the two NXN syllogisms, Aristotle's reason for taking Γ to be a member of the plurality associated with B is obviously the fact that B belongs to Γ with assertoric universal affirmation. Aristotle seems to take assertoric universal affirmation to imply that the (semantic value of the) subject term is a member of the plurality associated with the predicate term. Thus, (the semantic value of) an argument term of a categorical proposition is regarded as a member of the plurality associated with a term; for the term Γ is an argument term of a categorical proposition. If this is correct, it poses a problem to the set-theoretic semantics. In this semantics, the plurality associated with a term is identified with its semantic value, which in turn is taken to be a set of individuals. But an individual cannot serve as the (semantic value of an) argument term of a categorical proposition in the set-theoretic semantics. Thus, in the set-theoretic semantics, the phrase *τὸ δὲ Γ τι τῶν B ἐστί* cannot be taken to state that (the semantic value of the term) Γ is a member of the plurality associated with the term B.

At any rate, what is relevant to us here is the fact that in Aristotle's justification of the two perfect NXN syllogisms, the minor premiss is transformed into a genitive plural construction. Similarly, genitive plural constructions of the type *τὸ A τινὶ* (or *οὐδενὶ* or *μηδενὶ*) *τῶν B ὑπάρχει* occur frequently in the formulation of the minor premiss and the conclusion of perfect syllogisms.[39] Inasmuch as genitive plural constructions pertain to the *dictum*-semantics, this suggests that there is a certain relationship between the validity of perfect syllogisms and the *dictum*-semantics.

Aristotle explicitly refers to the assertoric *dictum de omni et de nullo*, which was introduced at the beginning of the assertoric syllogistic, when justifying the validity of perfect assertoric syllogisms.[40] At the beginning of the apodeictic syllogistic, Aristotle mentions the apodeictic *dictum de omni*, characterizing the semantics of universal affirmative necessity propositions (1.8.30a2–3). It is plausible to assume that this *dictum* is intended to justify the validity of the perfect syllogisms Barbara NNN and Barbara NXN in the apodeictic syllogistic.[41]

Aristotle does not spell out the apodeictic *dictum de omni*; he only says that this is similar to the assertoric one. Presumably, he had in mind that the apodeictic *dictum de omni* is obtained by adding a phrase like *ἐξ ἀνάγκης* at the very end of the formulation of the assertoric *dictum de omni* in 24b28–30. If so, the apodeictic *dictum de omni* reads: none of the items of the subject can be taken of which the predicate is not said of necessity.[42] In other words, for every member of the plurality associated with the subject term, it is necessarily a member of the plurality associated with the predicate term. For our purposes we need not specify what it is for an item to be necessarily a member of the plurality associated with a term. Whichever way of specifying this necessity is adopted, the logical form of the apodeictic and assertoric *dictum de omni* guarantees the validity, in the *dictum*-semantics, of Barbara NXN. If for every member of $\tau\hat{\omega}\nu$ B, it is necessarily a member of $\tau\hat{\omega}\nu$ A, and every member of $\tau\hat{\omega}\nu$ Γ is a member of $\tau\hat{\omega}\nu$ B, it follows that for every member of $\tau\hat{\omega}\nu$ Γ, it is necessarily a member of $\tau\hat{\omega}\nu$ A.

[39] Cf. n. 3 and n. 4.

[40] He does so in the justification of assertoric Barbara, Darii and Ferio, *APr.* 1.4.25b39–40, 26a24, 26a27. Cf. Alexander *in APr.* 61.3–5, 69.14–20; Ebert (n. 9), 229–30; Barnes (n. 10), 392–4.

[41] Several commentators hold the view that Barbara NNN or Barbara NXN or both syllogisms are justified by the apodeictic *dictum de omni*; for instance, Alexander *in APr.* 120.13–5, 125.33–126.8; R. Patterson, *Aristotle's Modal Logic. Essence and Entailment in the Organon* (Cambridge, 1995), 220; Barnes (n. 10), 395.

[42] Patterson (n. 41), 220.

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I shall not undertake to determine whether and, if so, how this justification of Barbara NXN can be related to Aristotle's own justification in 30a21–3. It is, I think, not straightforward to give a satisfactory interpretation of Aristotle's justification.[43] Nor is it obvious whether and, if so, how the evident correlation between perfect syllogisms and genitive plural constructions can help us to see exactly how Aristotle justifies each one of his perfect syllogisms. None the less, this correlation does indicate, I submit, how perfect syllogisms are, in principle, *meant* to be justified: it indicates that perfect syllogisms are meant to be justified within, and to be dependent upon, the *dictum*-semantics.

After all, Aristotle does not develop the *dictum*-semantics in any detail. He does not spell out the assertoric *dictum de nullo* or the *dicta* for the two particular assertoric propositions. Nor does he spell out the *dicta* for the four necessity propositions. Thus, Aristotle should not be expected to give us a detailed account of exactly how perfect syllogisms are justified within the *dictum*-semantics.

In the problematic syllogistic, Aristotle does not mention any *dictum* at all. More precisely, he does not mention, as he does in the assertoric and apodeictic syllogistic, a definition of notions such as 'being in a whole', 'being predicated of all' or 'being predicated of none'. Instead, he gives an analysis of two readings of universal affirmative two-sided possibility propositions (1.13.32b25–32). According to the first reading, the predicate is possibly said (λέγεσθαι) of whatever the subject is said of. According to the other reading, the predicate is possibly said of whatever the subject is *possibly* said of. Aristotle explicitly refers to this analysis when justifying the validity of the perfect syllogisms Barbara QQQ and Darii QQQ.[44] This is not the right place to discuss the logical properties of, and the relationship between, the two readings. For our purposes it suffices to note that the logical structure of either reading is similar to that which we attributed to the *dictum de omni*: for every x, if the subject term is predicated of x in a certain way, then the predicate term is predicated of x in a certain way. Moreover, Aristotle's formulation of the two readings contains the bare

[43] For instance, the justification might be taken to consist of an argument such as the following. First premiss: for every member of the plurality associated with the term B, A belongs with universal affirmative necessity to that member. Second premiss: Γ is a member of the plurality associated with the term B. Conclusion: A belongs with universal affirmative necessity to Γ (a similar argument is described by Alexander *in APr.* 126.23–8). However, this argument presupposes that the major premiss of Barbara NXN, A belongs with universal affirmative necessity to B, implies the first premiss of the argument.

[44] 1.14.32b40, 33a24–5; cf. Maier (n. 9), 144, n. 1; Patzig (n. 37), 63; W. Wieland, 'Die aristotelische Theorie der Möglichkeitsschlüsse', *Phronesis* 17 (1972), 124–52, at 129–33; Ebert (n. 9), 239. Presumably, Aristotle's justification of QQQ syllogisms refers to the second reading. The analysis of the two readings in 1.13.32b25–32 is referred to as a ὁρισμός (1.14.32b40, 33a25). I do not agree with those commentators who take one of these two occurrences of ὁρισμός to refer to the characterization of two-sided possibility as opposed to one-sided possibility in 1.13.32a18–21 (J. Hintikka, *Time & Necessity* [Oxford, 1973], 184; G. Seel, *Die Aristotelische Modaltheorie* [Berlin, 1982], 330; S. Waterlow, *Passage and Possibility* [Oxford, 1982], 16–7; J. van Rijen, *Aspects of Aristotle's Logic of Modalities* [Dordrecht, 1989], 30). This characterization of two-sided possibility is always referred to as a διορισμός (1.14.33b23, 1.15.33b28, 33b30, 34b27, cf. Maier (n. 9), 154 and 165–6; similarly the verb διορίζειν in 1.3.25b15, 1.17.37a27–8). For this terminological distinction between ὁρισμός and διορισμός, cf. K. Flannery, 'A rationale for Aristotle's notion of perfect syllogisms', *Notre Dame Journal of Formal Logic* 28 (1987), 455–71, at 468–70; P. Thom, *The Logic of Essentialism* (Dordrecht, 1996), 37. Thus, I do not agree with those commentators who take διορισμός in 33b23–30 to refer to the analysis of the two readings in 1.13.32b25–32 (Wieland [just quoted], 129–33; Ebert [n. 9], 239, n. 18).

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verb λέγεσθαι not accompanied by a quantifying pronoun (1.13.32b28–9) – just as the assertoric *dictum de omni* in 1.1.24b30. Thus, Aristotle's analysis of the two readings may be viewed as a kind of *dictum de omni* for two-sided possibility propositions.[45] If this is correct, that analysis pertains to the *dictum*-semantics, and Aristotle's justification of the perfect QQQ syllogisms relies on the *dictum*-semantics.

VI. ROSS' ARGUMENTS AGAINST *ΤΩΝ*

Genitive plural constructions of the type τὸ *A* τινὶ (or οὐδενὶ or μηδενὶ) τῶν *B* ὑπάρχει are rare in Ross's 1949 edition of the *Analytics* (whose text is identical to that of the 1964 OCT edition). Ross prefers the corresponding dative singular constructions whenever he found any evidence for them in one of the MSS or in one of the ancient commentaries or translations. Often he prefers the dative singular although this is only found in one of the ancient commentators or in a Syriac translation while all MSS have the genitive plural.[46] From a philological point of view, this strategy is questionable.[47]

Ross gives three reasons for adopting that strategy.[48] First, he argues that genitive plural phrases like τῶν *A* refer to a plurality of individuals, which is not in accordance with Aristotle's way of thinking of the argument terms of categorical propositions. I agree that Aristotle did not think of terms as pluralities of individuals. However, I do not agree with Ross's intuition that genitive plural phrases like τῶν *A* refer to a plurality of individuals (although several commentators agree with Ross on this point[49]). While that intuition may be sound with respect to phrases like 'the As' or 'the animals' in English, it is not sound with respect to genitive plural phrases in Aristotle's philosophical Greek. For instance, Aristotle is prepared to say that each one of the animals is either a species or an individual:[50]

ἕκαστον γὰρ τῶν ζῴων ἢ εἶδός ἐστιν ἢ ἄτομον (*Top.* 6.6.144b2–3)

Ross's second reason is that there is no reason why Aristotle should have sometimes used genitive plural constructions and sometimes dative singular constructions. He presupposes that there is no significant difference between the two kinds of construction.[51] However, as I hope has been made plausible in this paper, the two kinds of construction do differ significantly in their syntactic structure and in their function within Aristotle's syllogistic.

The third reason is that the genitive plural constructions are rather rare in Alexander's commentary on the *Prior Analytics*. Now, Alexander seems to have misgivings

[45] Cf. I. Mueller, *Alexander of Aphrodisias: On Aristotle's 'Prior Analytics' 1.14–22*. (Ithaca, New York, 1999), 185, n. 6.

[46] For instance, 1.11.31b1, 1.14.33a14, 33a15, 1.16.36a34, 36a38, 1.19.38a24. Only when he found no ancient evidence for the dative singular at all, Ross accepts the genitive plural (1.14.33a27, 1.17.37a5, 37a18).

[47] Cf. the criticism by Smith (n. 8), 236.

[48] Ross (n. 10), 293.

[49] Smith (n. 30), 120; Ebert (n. 9), 230–1, n. 11; Wolff (n. 9), 159; Drechsler (n. 9), 290 and 31.

[50] In Aristotle's biological writings, phrases like ἕκαστον τῶν ζῴων or τὰ καθ' ἕκαστον ζῷα are often used to refer to infimae species of animal rather than to individual animals; for instance *GA* 1.20.728b13, 4.10.777a32, *HA* 4.9.536a14, *MA* 11.704a3, *PA* 1.3.644a10–1, 1.5.645a22, 2.1.646a8–9, 2.2.648a16, 3.14.674a13; cf. D. Balme, *De Partibus Animalium I and De Generatione Animalium I* (Oxford, 1992), 106. In *Met.* Z.12.1038a18, the phrase τὰ ὑπόποδα ζῷα refers to a collection consisting exclusively of infimae species of animal, not of individual animals.

[51] This presupposition is also accepted by Barnes (n. 10), 334.

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not only about genitive plural constructions of the type *τὸ A τινὶ* (or *οὐδενὶ* or *μηδενὶ*) *τῶν B ὑπάρχει* but also about other genitive plural constructions. He tends to use singular articles even where, for all we know, Aristotle certainly wrote a genitive plural article. For example, Aristotle's phrase *τὸ γὰρ Γ τῶν B τί ἐστιν* in 1.2.25a17 is 'cited' by Alexander (*in APr.* 33.22) as follows: *ἐπήνεγκε γοῦν τὸ γὰρ Γ τοῦ B τί ἐστιν*. Similarly, Alexander (*in APr.* 103.26) correctly cites Aristotle's phrase *ἐὰν ληφθῇ τι τῶν Σ* in *APr.* 1.6.28b21, but goes on to use genitive singular phrases in his interpretation of this passage (103.30, 103.32, 104.4). While Aristotle virtually never uses genitive singular phrases like *τὸ A τι τοῦ B ἐστίν* or *τὶ τοῦ Σ λαμβάνειν* in the *Prior Analytics*,[52] they are common in Alexander's commentary.[53] Whatever reasons Alexander may have had for preferring singular to plural articles, he is not a reliable witness as to where Aristotle wrote genitive plural articles.

I conclude that Ross's reasons for excising the large majority of genitive plural constructions of the type *τὸ A τινὶ* (or *οὐδενὶ* or *μηδενὶ*) *τῶν B ὑπάρχει* are not convincing. In future editions of the *Prior Analytics* these constructions should be printed at least in all those places where they are attested by four of the five major MSS.

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APPENDIX

The purpose of this appendix is to give an overview of the MS evidence for genitive plural constructions of the type *τὸ A τινὶ* (or *οὐδενὶ* or *μηδενὶ*) *τῶν B ὑπάρχει* in *Prior Analytics* 1.1–22. We shall take into account the five most important MSS of the *Analytics*: Urbinas 35 (A), Marcianus 201 (B), Coislinianus 330 (C), Laurentianus 72.5 (d) and Ambrosianus 490 (n). The following list contains all passages where according to the 1949 edition of D. Ross or the 1984 collation of M. Williams[54] there is any MS evidence for the genitive plural construction. As the apparatus of Ross and Williams often differ from each other, I made a recollation of the five MSS from microfilm at the Aristoteles-Archiv, Freie Universität Berlin. The results are summarized in the list below; they often differ from Ross's apparatus, sometimes also from Williams's apparatus.[55]

The first column specifies the line (in Ross's edition) which contains the genitive plural or dative singular article in question. If a single line contains two potential instances of the phrase *τῶν B* or *τῷ B*, then *TΩ*? B^1 refers to the first and *TΩ*? B^2 to the second instance. The number 0 indicates that the relevant MS has the dative singular article in the passage at issue. The number 1 indicates that the first hand of the MS has the genitive plural article. The number 2 indicates that a secondary hand of the MS has the genitive plural article.

[52] An exception would be the phrase *ὅταν μηδὲν ᾖ λαβεῖν τῶν τοῦ ὑποκειμένου* in the assertoric *dictum de omni* in 24b29 if the genitive plural article in it is not accepted.

[53] For the first construction, cf. Alexander *in APr.* 32.15–8, 34.10, 55.6–7, 61.25–6, 122.6–123.1, 126.2, 130.9–10, 144.31, 145.3–4, 174.22–6, 175.2; for the second construction, cf. 99.33, 100.4, 104.4, 144.27.

[54] *Studies in the Manuscript Tradition of Aristotle's Analytica* (Königstein, 1984).

[55] For instance, neither apparatus contains the information that all MSS have *τῶν B* in 39a34 and 39a35. Further passages where the list given below differs from Williams's apparatus include 25a15, 25a18, 25a19, 26a25, 30b16, 31a9; these latter differences are of minor importance, though, for the points made in this paper.

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The last column indicates in which passages the genitive plural article is attested by at least four of the five MSS (either by the first hand or by a secondary hand). These are the thirty-three passages discussed at the beginning of this paper. It might be worth noting that the class of these thirty-three passages is almost coterminous with the class of those passages in which the genitive plural article is attested by the three MSS A, B and C.[56]

		A	B	C	d	n	four of five
25a15	*ΤΩ*? *B*	1	1	2	1	0	•
25a15	*ΤΩ*? *A*	1	1	1	1	1	•
25a16	*ΤΩ*? *B*	1	1	1	1	1	•
25a18	*ΤΩ*? *B*	1	0	2	0	0	
25a18	*ΤΩ*? *A*	2	0	2	0	1	
25a19	*ΤΩ*? *B*	2	0	2	0	0	
25a21	*ΤΩ*? *B*	1	1	1	1	1	•
25a21	*ΤΩ*? *A*	1	1	1	1	1	•
25a22	*ΤΩ*? *B*	1	1	1	1	1	•
25a23	*ΤΩ*? *B*	1	1	1	1	1	•
25a23	*ΤΩ*? *A*	2	0	1	0	1	
25a30	*ΤΩ*? *B*	2	0	1	0	0	
25a30	*ΤΩ*? *A*	2	0	1	0	0	
25a31	*ΤΩ*? *B*	2	0	1	0	0	
25a32	*ΤΩ*? *B*	2	0	1	0	0	
25a33	*ΤΩ*? *A*	2	0	1	0	0	
25a34	*ΤΩ*? *B*	2	0	1	0	0	
25b1	*ΤΩ*? *B*	2	0	1	0	τὸ B	
25b1	*ΤΩ*? *A*	2	0	1	0	0	
25b2	*ΤΩ*? *B*	2	0	1	0	0	
26a25	*ΤΩ*? *Γ*	0	0	0	0	1	
26a33	*ΤΩ*? *B*	2	0	0	0	0	
27a35	*ΤΩ*? Ξ^2	1	1	0	1	om.	
30b16	*ΤΩ*? B^2	1	1	1	1	0	•
31a9	*ΤΩ*? Γ^1	1	1	1	1	0	•
31a9	*ΤΩ*? Γ^2	1	1	1	1	0	•
31a41	*ΤΩ*? *Γ*	1	0	1	1	1	•
31b1	*ΤΩ*? B^1	1	1	1	1	1	•
31b1	*ΤΩ*? B^2	1	1	1	1	1	•
33a14	*ΤΩ*? *B*	1	1	1	1	1	•
33a15	*ΤΩ*? *Γ*	1	1	1	1	1	•
33a26	*ΤΩ*? *Γ*	1	1	0	1	0	
33a27	*ΤΩ*? *Γ*	1	1	1	1	1	•
35a8	*ΤΩ*? *Γ*	1	1	1	0	1	•
36a9	*ΤΩ*? *B*	2	0	0	0	0	

[56] The only difference is that this latter class does not contain the four instances in 31a41, 36a36, 36b36, 39a19. The class of the thirty-three instances is also similar to the list of genitive plural constructions accepted by Smith (n. 8), 237. The only two differences are that this latter list does not contain the six instances in 25a15 (*τῶν A*), 25a23, 31a41, 35a8, 36b36, 39a35, and that in 39a18 it contains the phrase *τῶν Γ* instead of *τῶν B* (the three instances in 33a27, 37a5, 37a18 are not mentioned by Smith because they are already accepted by Ross).

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		A	B	C	d	n	four of five
36a18	*TΩ*? *B*	1	1	0	1	0	
36a34	*TΩ*? *B*	1	1	1	1	1	•
36a35	*TΩ*? *Γ*	1	1	0	1	0	
36a36	*TΩ*? *Γ*	1	1	0	1	1	•
36a38	*TΩ*? Γ^2	1	1	1	1	1	•
36b36	*TΩ*? *B*	2	1	0	1	1	•
36b37	*TΩ*? *A*	0	0	1	0	0	
36b38	*TΩ*? *A*	0	0	0	0	1	
37a5	*TΩ*? *A*	1	1	1	1	1	•
37a13	*TΩ*? *A*	1	1	1	1	1	•
37a14	*TΩ*? *B*	1	1	1	1	1	•
37a15	*TΩ*? *A*	0	0	1	0	0	
37a18	*TΩ*? *A*	1	1	1	1	1	•
38a22	*TΩ*? *Γ*	1	1	1	1	1	•
38a24	*TΩ*? Γ^1	1	1	1	1	1	•
38a24	*TΩ*? Γ^2	1	1	1	1	1	•
38a30	*TΩ*? *Γ*	0	0	0	1	0	
39a17	*TΩ*? *B*	2	0	0	0	0	
39a18	*TΩ*? *B*	1	1	1	0	1	•
39a19	*TΩ*? *B*	om.	1	1	1	1	•
39a21	*TΩ*? *B*	0	0	1	0	1	
39a32	*TΩ*? Γ^2	0	0	1	0	1	
39a34	*TΩ*? *B*	1	1	1	1	1	•
39a35	*TΩ*? B^1	1	1	1	1	1	•
39b14	*TΩ*? *B*	1	1	1	1	1	•
40a20	*TΩ*? *Γ*	1	1	0	1	0	

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