Concept predications and hierarchies in Aristotelian *Organon*: A philosophical ontology presented in terms of a software ontology

Markos Dendrinos

Abstract: Based on the two distinct Aristotelian fundamental predications, namely the essential predication *being said* of a subject and the accidental predication *is in/ existing in* a subject, I attempt to shed light on the several types of predication relations met in the Aristotelian *Organon* and to construct an overall conceptual map including the various relations mentioned in the Aristotelian text. This scheme includes [1] the implicit category tree of classified concepts in terms of genera and species, where a subject-member of a lower class conveys the feature-member of an upper class, as the lower class is a subset of the upper class, [2] ideas predicated of ideas, where the predicate-idea is contained as a feature in the subject-idea. The ideal software environment for the representation of hierarchical trees and custom-defined relationships is the Protégé OWL (Ontology Web Language) equipped with powerful visual tools for the display and extraction of the entire or partial diagrams.

Keywords: Aristotle, Organon, ancient philosophy, predication, logical reasoning, software ontology.

1. Introduction

The goal of this research is to locate and extract from the Aristotelian *Organon* (Categories, Analytics Prior, Topics) all the occurrences of predication/ participation relations of the type 'A *is* B', expressed in multiple ways.

The Aristotelian relations to be studied are of the following forms: a species/ genus B *is said of* something A, a feature B *is in* [*ἐστίν ἐν τινὶ*] something A, something B *exists in* [*ὑπάρχει τινὶ*] something A, something B *follows to* [*ἀκολουθεῖ τινὶ*] something A.

The meaning of the simple predicate proposition 'A is B' is neither trivial nor univocal. There are various types of relations, hidden under the copula 'is'. This article aims at locating and extracting Aristotelian predication relations of various types, organizing them in categories and importing them in a software ontology in the form of a complete conceptual map. The various types of predications are analysed theoretically in Chapter 2, leading to 5 distinct categories. In Chapter 3, Analytics Prior (and Topics in one case) are selected, because they include a lot of predications, the most of them as examples of the two given propositions of a false syllogism. Their truth is certain, since the various syllogistic modes are examined for validity, under the presupposition that the given propositions are true. All the mentioned predications (61 relations) are recorded and categorized in one of the 5 predefined categories. Chapter 4 includes a brief description of the structure of a software ontology. In Chapter 5 all the previously categorized extracted relations are imported in the software ontology in order to construct a conceptual map covering the main schemes of Aristotelian Logic, followed by visual instances of the content. This map will be very useful for researchers of ancient philosophy, since they will have at their disposal a complete organization of the universals mentioned in the Aristotelian texts along with all their mutual relations of multiple types, followed by the corresponding passages. The theoretical analysis in Chapter 2 presents the criteria for the inclusion of each predication relation in one of the 5 predefined types. The import of the extracted relations in the software ontology environment offers additional benefits for the researchers: [1] they can make use of the tools of the software ontology to search for any Aristotelian universal and its relations, the type and passage of each of the retrieved relations as well as all the universals connected to the universal under examination, [2] they can do advanced searches based on either the predication type or a certain universal [3] they can use the visual tools embedded in the ontology in order to make a graph for any Aristotelian universal after the selection of all or some of the predefined categories of relations.

Various attempts in the interdisciplinary area of digital humanities have emerged, especially in the field of the extraction of typical logic relations from philosophical texts. The benefits from the transformation of the natural language philosophical propositions to typical expressions include categorization, their manipulation in deduction rules schemata, mechanical evaluation of argumentation and more effective search and retrieval mechanisms.

George Boole has presented in his *Laws of Thought* an equivalent mathematical representation of the type of predication embedded in the various schemes of the Aristotelian syllogism (Dendrinos: 2011). Similar research work has also been done in identifying the distinct nature of the various predications met in *Sophist* (Dendrinos: 2011). Also in *Philosophical Views about Digital Information and Relational Schemata* a review of ancient classification schemata in respect to modern relationship types is exhibited (Dendrinos: 2006). It is claimed in this article that the relations mentioned in Platonic *Sophist*

Department of Archival, Library & Information Studies, University of West Attica
Athens, Greece
email: mdendr@uniwa.gr

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imply the earliest distinction between the two ways of predication: BT/NT (broader term/ narrower term) and equivalence. The process of the extraction of typical predicate relations from a philosophical text and the construction of an analytical concept map has been presented in detail in the case of Platonic *Parmenides*, concerning the various types of relations of the Idea of one. The Ideas and their relations have been organized, in this article, in the frame of a software ontology (Dendrinos: 2015). Additionally a similar work concerning the various kinds of Platonic predication relations has been published (Dendrinos: 2022).

2. Various formulations of predication in Aristotle

Aristotle was the first who attempted to give an accurate presentation of the two distinct functionalities of the same formally type of predication. He actually wrote down in the beginning of his work *Categories* (Chapter 2. 1a20.ff) the two different forms of predication, the essential predication (*is said of*) and the accidental predication (*is in*), as follows:

"Of things there are: (a) some are said of a subject [*καθ' ὑποκειμένου τινὸς λέγεται*] but are not in any subject. For example, man is said of a subject, the individual man, but is not in any subject. (b) Some are in a subject [*ἐν ὑποκειμένῳ ἐστι*] but are not said of any subject. (By 'in a subject' I mean what is in something, not as a part, and cannot exist separately from what it is in.) For example, the individual knowledge-of-grammar *is in* a subject, the soul, but *is not said of* any subject; and the individual white is in a subject, the body (for all colour is in a body), but is not said of any subject. (c) Some are both *said of* a subject and *in* a subject. For example, knowledge is in a subject, the soul, and is also said of a subject, knowledge-of-grammar. (d) Some *are neither in* a subject *nor said of* a subject, for example, the individual man or the individual horse —for nothing of this sort is either in a subject or said of a subject. Things that are individual and numerically one are, without exception, not said of any subject, but there is nothing to prevent some of them from being in a subject— the individual knowledge-of-grammar is one of the things in a subject"[1].

Of the above four cases, (a) and (c) are predications, where the predicate is a genus/ species or a property respectively. Cases (b) and (d) are not predications, since the position of the predicate is occupied by a particular property and an individual substance respectively.

Essential predication (case a) concerns the relation of a substance to a species/ genus (secondary substance). In the terminology of current conceptual schemes it is the relation between an individual and the class in which it belongs or between an element and a set of elements sharing a common characteristic. In mathematical terms it is the relation $x \in A$ (element x belongs to set A). Let call this type of predication *Aristotelian.type.1.element-inclusion*. The name used to denote this predication in the frame of this paper, based on the textual expressions, is: [predicate] *is-said-of** [subject] (* λέγεται).

Case (c) accidental predications are called by Cohen cross-categorial predications[2], since the property being present in the subject does not belong to the familiar category tree of the subject but to a different category tree. An indicative example is his explanation of the predication 'this horse is white': white is *said of* an individual bit of white color, and also white *is in* the certain horse. In this way a particular bit of color is classified to the color-universal white and also the color *is in* (inheres in) a certain subject (this horse). Another example of this type of accidental predications is 'Socrates is wise', which can be analyzed as follows: wisdom (as a property) *is in* Socrates and in parallel wisdom *is said of* a specific subject, such as knowledge-of-grammar.

Accidental predication (case c) concerns the relation of a substance to a quality (property). This is not a necessary connection between the substance (subject) and the quality (predicate). 'A certain horse is white' is equivalent to 'a certain horse has the property of white'. Let call this type of predication *Aristotelian.type.2.is-present-in*. The name used to denote this predication is: [predicate] *is-in** [subject] (* ἐν τινὶ ἐστίν).

An important subcase of the general propositional scheme 'A *is* B' is the case, where both subject and predicate are occupied by secondary substances, where one is subspecies of the other, such as human is animal. We can consider them as classes, where a class A *is a subset of* a class B, or class B is a *superset* of A. In mathematical terms this is the relation $A \subset B$ or $B \supset A$. This relation is described in *Categories*, under the term of division of a genus into a number of species. Let call this type of predication *Aristotelian.type.3.genus-division*. The name used to denote this predication is: [predicate] *divided-into* [subject].

Taking also into account the terminology used by Aristotle in *Prior Analytics* concerning the various schemes of syllogism, we ought to add some additional elements to the Aristotelian theory of predication. In the predicative propositions 'A *is* B', given by various expressions, the place of A or B (subject or predicate) can be occupied by either secondary substances or properties indifferently[3]. Also, the subjects are used *in a whole* [*παντὶ, καθόλου*] or *in some* [*τινὶ, κατὰ μέρος*] as terms of which other terms (the predicates) are said of.

The remaining cases such as 'some white are human' or 'some human are white', are predications where secondary substances and properties are interconnected in any direction. Let call this type of predication *Aristotelian.type.4.predicated-of*. The names used to denote this predication are: [predicate] *is-predicated-of* (κατηγορεῖται) or *is-said-of* (λέγεται) or *is-in* (ἐν τινὶ ἐστὶν) or *exists-in* (ὑπάρχει τινὶ) or *follows-to* (ἀκολουθεῖ τινὶ) [subject]. Let select one of these terms as the one to be used in our conceptual scheme: [predicate] *exists-in* [subject]. This general type of predication is performed in one of 4 distinct types: in a whole, in some, not in some and in none, denoted as: [predicate] *exists-in-all* [subject], [predicate] *exists-in-some* [subject], [predicate] *does-not-exist-in-some* [subject], [predicate] *exists-in-no* [subject] respectively.

Aristotle uses a great number of certain true predications as given premises in order to clarify various cases of false syllogistic modes. These predications will be presented in detail in the next chapter.

Lastly, Aristotle mentions in *Topicorum* a Platonic like relation, where an idea (human-himself) in the posi-

tion of the subject is characterized by a property (motionless) in the position of the predicate. Let call this type of predication *Aristotelian.type.5.exists-in-idea*. The term used to denote this predication is: [predicate] *exists-in** [subject] (* ὑπάρχει τινὶ), where the subject is an idea. This example will be also presented in the next chapter.

3. Constructing the Aristotelian conceptual scheme

To denote the main distinction between things that are predicated of subjects and things which cannot be predicates of anything in my conceptual scheme I use two wide classes: *universal* [*καθόλου*] and *particular* [*καθ' ἕκαστον*][4], based on the following passage of *On Interpretation*:

"There are on the one hand the universals of things and on the other hand the particulars. Universals are the things of such nature that are predicated of many subjects, while the particulars those that are not. Thus human is a case of universal and Kallias a case of particular"[5] (Aristotle, *On Interpretation,* Part 7, 17a381-2).

Three subclasses of the main class *universal* are set: *genus.species*, *concept* and *idea*. *Genus.species* class is used in the case of the relations: *is-said-of* and *divided-into*. *Concept* class is used for the qualities taking part in the relation: *is-in* (present in a substance) or *exists-in* (existing in an idea). *Idea* class is used for the ideas where a quality *exists-in*. Lastly, the main class *Universal* class is used in the case of the relations: *exists-in-all*, *exists-in-no*, *exists-in-some*, *does-not-exist-in-some*.

Aristotelian.type.1.element-inclusion.

human is said of an individual human ⇔
|Pred.1| [human] *is-said-of* [Socrates]

Aristotelian.type.2.is-present-in

knowledge is in a subject: the soul of Socrates ⇔
|Pred.2| [knowledge] *is-in* [Socrates]
knowledge is also said of a subject: knowledge-of-grammar ⇔
|Pred.3| [knowledge] *is-said-of* [knowledge-of-grammar]

Aristotelian.type.3.genus-division

Aristotle in *Categories* presents the division of genera into a number of species, giving as example the division of the genus 'animal' into the subspecies: winged, terrestrial, water animals, as follows:

"I mean those species which are distinguished each from each by one and the same method of division. Thus the 'winged' species is simultaneous with the 'terrestrial' and the 'water' species"[6] (Categories, Part13, 15a2-4).

These predications in typical formulation are:

|Pred.4| [animal] *divided-into* [winged]
|Pred.5| [animal] *divided-into* [terrestrial]
|Pred.6| [animal] *divided-into* [water]

Aristotelian.type.4.predicated-of

The various predications are mentioned in the frame of the 3 Aristotelian syllogistic schemes.

1st Aristotelian syllogistic scheme

"If A is predicated of all B, and B of all C, A must be predicated of all C: we have already explained what we mean by 'predicated of all'. Similarly also, if A is predicated of no B [*κατὰ μηδενὸς κατηγορεῖσθαι*], and B of all C [*κατὰ παντὸς κατηγορεῖσθαι*], it is necessary that C will exist in no A [*οὐδενὶ ὑπάρξει*]". (Arist. *Anal. Pr.* Book1, Part 4, 25b32-26a2)[7].

The only valid syllogistic modes of the 1st scheme are: Barbara (aaa), Celarent (eae), Darii (aii), Ferioque (eio).

Aristotle offers certain examples of predications of the two given premises in order to show that not all of the modes of the 1st scheme are valid. To attain this he obviously considers that the given premises are true cases of predications, which I collect to import them in my overall conceptual scheme.

Examples of false syllogisms of the 1st scheme as explained in *Prior Analytics* follow:

"But if the first term belongs to all the middle, but the middle to none of the last term, there will be no syllogism in respect of the extremes; for nothing necessary follows from the terms being so related; for it is possible that the first should not exist either in all or in any of the last, so that neither a particular nor a universal conclusion is necessary. But if there is no necessary consequence, there cannot be a syllogism by means of these premises. As an example of a universal affirmative relation between the extremes we may take the terms animal – man - horse; of a universal negative relation, the terms animal – human - stone. Nor again can syllogism be formed when neither the first term exists in any of the middle, nor the middle in any of the last. As an example of a positive relation between the extremes take the terms science – line – medicine, of a negative relation science – line - unit". (Arist. *Anal. Pr.* Book1, Part 4, 26a2-9)[8].

In the above text Aristotle presents the falsity of the 'ae' and 'ee' forms.

The first example of the false application ('ae' form) of the 1st syllogistic scheme is given by the triad of terms: animal, man, horse, implied in 2 given predication-premises. Each of these predications will be characterized in order to be imported in the software conceptual scheme. Let put them in Aristotelian terminology.

animal exists in all humans / human exists in no horse

The second false example ('ae' form) is made by the triad: animal – human – stone:

animal exists in all humans / human exists in no stone

The third false example ('ee' form) is made by the triad: science – line - medicine.

science exists in no line / line exists in no medicine

The fourth false example ('ee' form) is made by the triad: science – line - unit.

science exists in no line / line exists in no unit

"But if the universality is posited with respect to the minor term either affirmatively or negatively, a syllogism will not be possible, whether the major premise is positive or negative, indefinite or particular: e.g. A exists or does not in some B, and B exists in all C. As an example of a positive relation between the extremes take the terms good, habit, prudence-situation: of a negative relation, good, habit, uneducatedness-situation. Again if B exists in no C, but A exists or does not exist in some B or A exists in no B, there cannot be a syllogism. Take the terms white- horse - swan and white – horse - raven" (Arist. *Anal. Pr.* Book1, Part 4, 26a30-39)[9].

In the above text Aristotle presents the falsity of the 'ia', 'oa', 'ie', 'oe', 'ee' modes.

The fifth false example ('ia' form) is made by the triad: good – habit – prudence situation:

good exists in some habits / habit exists in all prudence situations

The sixth false example ('ia' form) is made by the triad: good – habit – uneducatedness situation:

good exists in some habits / habit exists in all uneducatedness situations

The seventh false example ('ie' form) is made by the triad: white – horse – swan:

white exists in some horses / horse exists in no swan

The eighth false example ('oe' form) is made by the triad: white – horse – raven:

white does not exist in some horses / horse exists in no raven

"Nor when the major premise is universal, whether affirmative or negative, and the minor premise is negative and particular, can there be a syllogism, whether the minor premise be indefinite or particular: e.g. A exists in all B and B does not exist in some C or B does not exist in all C… Suppose the terms are animal – human - white· next take some of the white things of which human is not predicated, swan and snow: animal is predicated of all of the one, but of none of the other. Consequently there cannot be a syllogism. Again let A does not exist in any B, but let B does not exist in some C. Take the terms inanimate – human - white: then take some white things of which human is not predicated, swan and snow: the term inanimate is predicated of all of the one, but of none of the other. (Arist. *Anal. Pr.* Book1, Part 4, 26a39- 26b14)[10].

In the above text Aristotle presents the falsity of the 'ao', 'ae', 'eo' modes.

The ninth false example ('ao' form) is made by the triad: animal – human – white:

animal exists in all humans / human does not exists in some white (things)

But this is in contrast to the case of swans/ snow replacing white (things) since animal is predicated of all swans, in Aristotelian terminology: *animal exists in all swans* and animal is predicated of no snow, that is, *animal exists in no snow*.

The tenth false example ('eo' form) is made by the triad: inaminate – human – white:

inaminate exists in no human / human does not exists in some white (things)

But this is in contrast to the case of snow replacing white (things) since inaminate is predicated of all snow, in Aristotelian terminology: *inaminate exists in all snow* and inaminate is predicated of no swan, that is, *inaminate exists in no swan*.

The predications to be imported in the conceptual scheme in typical formulation are the following:

|Pred.7| [animal] *exists-in-all* [human]
|Pred.8| [human] *exists-in-no* [horse]
|Pred.9| [human] *exists-in-no* [stone]
|Pred.10| [science] *exists-in-no* [line]
|Pred.11| [line] *exists-in-no* [medicine]
|Pred.12| [line] *exists-in-no* [unit]
|Pred.13| [good] *exists-in-some* [habit]
|Pred.14| [habit] *exists-in-all* [prudence situation]
|Pred.15| [habit] *exists-in-all* [uneducatedness situation]
|Pred.16| [white] *exists-in-some* [horse]
|Pred.17| [horse] *exists-in-no* [swan]
|Pred.18| [white] *does-not-exists-in-some* [horse]
|Pred.19| [horse] *exists-in-no* [raven]
|Pred.20| [human] *does-not-exists-in-some* [white]
|Pred.21| [animal] *exists-in-all* [swan]
|Pred.22| [animal] *exists-in-no* [snow]
|Pred.23| [inaminate] *exists-in-no* [human]
|Pred.24| [inaminate] *exists-in-all* [snow]
|Pred.25| [inaminate] *exists-in-no* [swan]

2nd Aristotelian syllogistic scheme

"Whenever the same thing exists in all of one subject, and to none of another, or in all of each subject or in none of either, I call such a figure the second; by middle term in it I mean that which is predicated of both subjects, by extremes the terms of which this is said, by major extreme that which lies near the middle, by minor that which is further away from the middle. The middle term stands outside the extremes, and is first in position" (Arist. *Anal. Pr.* Book1, Part 5, 26b34-39)[11].

The only valid syllogistic modes of the 2nd scheme are: Cesare (eae), Camestres (aee), Festino (eio), Baroco (aoo).

Next Aristotle presents again false modes of the 2nd scheme, through examples.

"If M is predicated of every N and O, there cannot be a syllogism. Terms to illustrate a positive relation between the extremes are substance – animal – human, while for a negative relation are substance – animal – number, with substance being the middle term. Nor is a syllogism possible when M is predicated neither of any N nor of any O. Terms to illustrate a positive relation are line – animal – human, a negative relation are line – animal - stone" (Arist. *Anal. Pr.* Book1, Part 5, 27a18-23)[12].

In the above text Aristotle presents the falsity of the 'aa', 'ee' forms.

The first false example ('aa' form) is made by the triad: substance – animal – human:

substance exists-in-all animals / substance exists-in-all humans

The second false example ('aa' form) is made by the triad: substance – animal – number:

substance exists-in-all animals / substance exists-in-all numbers

The third false example (‘ee’ form) is made by the triad: line - animal - human:

line exists in no animal / line exists in no human

The fourth false example (‘ee’ form) is made by the triad: line - animal - stone:

line exists in no animal / line exists in no stone

“But if M is predicated of all O, but not of all N, there will be no syllogism. Take the terms animal – substance – raven and animal – white - raven. Nor will there be a conclusion when M is predicated of no O, but of some N. Terms to illustrate a -positive relation between the extremes are animal – substance – unit, a negative relation are animal – substance - science“ (Arist. *Anal. Pr.* Book1, Part 5, 27b4-8)[13].

In the above text Aristotle presents the falsity of the ‘oa’, ‘ie’ forms.

The fifth false example (‘oa’ form) is made by the triad: animal – substance – raven:

animal does not exist in some substances / animal exists in all ravens

The sixth false example (‘oa’ form) is made by the triad: animal – white – raven:

animal does not exist in some white (things) / animal exists in all ravens

The seventh false example (‘ie’ form) is made by the triad: animal – substance – unit:

animal exists in some substances / animal exists in no unit

The eighth false example (‘ie’ form) is made by the triad: animal – substance – science:

animal exists in some substances / animal exists in no science

“Let M exist in no N, and not to some O. It is possible then for N to exist either in all O or in no O. Terms to illustrate the negative relation are black – snow - animal” (Arist. *Anal. Pr.* Book1, Part 5, 27b13-16)[14].

In the above text Aristotle presents the falsity of the ‘eo’ form.

The ninth false example (‘eo’ form) is made by the triad: black – snow - animal:

black exists in no snow / black does not exist in some animals

“Let M exist in all N and in some O. It is possible then for N to exist in all O or in no O. Terms to illustrate the negative relation are white – swan - stone“ (Arist. *Anal. Pr.* Book1, Part 5, 27b24-27)[15].

In the above text Aristotle presents the falsity of the ‘ai’ form.

The tenth false example (‘ai’ form) is made by the triad: white – swan - stone:

white exists in all swans / white exists in some stones

“M exists in no O, and not to some N, it is possible for N to exist either in all O or in no O. Terms for the positive relation are white – animal – raven, for the negative relation are white – stone - raven. If the premises are affirmative, terms for the negative relation are white – animal – snow, while for the positive relation are white- animal - swan” (Arist. *Anal. Pr.* Book1, Part 5, 27b29-34)[16].

In the above text Aristotle presents the falsity of the ‘ie’, ‘ia’ forms.

The eleventh false example (‘ie’ form) is made by the triad: white – animal – raven:

white exists in some animals / white exists in no raven

The twelfth false example (‘ie’ form) is made by the triad: white – stone - raven:

white exists in some stones / white exists in no raven

The thirteenth false example (‘ia’ form) is made by the triad: white – animal – snow:

white exists in some animals / white exists in all snows

The fourteenth false example (‘ia’ form) is made by the triad: white – animal – swan:

white exists in some animals / white exists in all swans

“Nor is one possible if the middle term exists in some of each of the extremes, or does not exist in some of either, or exists in some of the one, not in some of the other, or exists in neither universally, or is related to them indefinitely. Common terms for all the above are white – animal – human and white – animal - inanimate” (Arist. *Anal. Pr.* Book1, Part 5, 27b36-39)[17].

In the above text Aristotle presents the falsity of the ‘ii’ form.

The fifteenth false example (‘ii’ form) is made by the triad: white – animal – human:

white exists in some animals / white exists in some humans

The sixteenth false example (‘ii’ form) is made by the triad: white – animal – inaminate:

white exists in some animals / white exists in some inaminates

The predications to be imported in the conceptual scheme in typical formulation are the following:

|Pred.26| [substance] *exists-in-all* [animal]
|Pred.27| [substance] *exists-in-all* [human]
|Pred.28| [substance] *exists-in-all* [number]
|Pred.29| [line] *exists-in-no* [animal]
|Pred.30| [line] exists-*in-no* [human]
|Pred.31| [line] *exists-in-no* [stone]
|Pred.32| [animal] *does-not-exist-in-some* [substance]
|Pred.33| [animal] *exists-in-all* [raven]
|Pred.34| [animal] *exists-in-some* [substance]
|Pred.35| [animal] *exists-in-no* [unit]
|Pred.36| [animal] *exists-in-no* [science]
|Pred.37| [black] *exists-in-no* [snow]
|Pred.38| [black] *does-not-exist-in-some* [animal]
|Pred.39| [white] *exists-in-all* [swan]
|Pred.40| [white] *exists-in-some* [stone]

|Pred.41| [white] *exists-in-some* [animal]
|Pred.42| [white] *exists-in-no* [raven]
|Pred.43| [white] *exists-in-all* [snow]
|Pred.44| [white] *exists in some* [human]
|Pred.45| [white] *exists in some* [inaminate]

3rd Aristotelian syllogistic scheme

"But if one term exists in all and another one in none of a third, or if both exist in all or in none of the third, I call such a figure the third; by middle term in it I mean that of which both the predicates are predicated, by extremes I mean the predicates, by the major extreme that which is further from the middle, by the minor that which is nearer to it. The middle term stands outside the extremes, and is last in position" (Arist. *Anal. Pr.* Book1, Part 6, 28a10-17)[18].

The only valid syllogistic modes of the 3rd scheme are: Darapti (aii), Felapton (eao), Disamis (iai), Datisi (aii), Bocardo (oao), Ferison (eio).

Next Aristotle presents again false modes of the 3rd scheme, through examples.

"If R exists in no S, P in all S, there will be no syllogism. Terms for the positive relation are animal – horse – human, while for the negative relation are animal – inanimate - human. Nor can there be a syllogism when both terms are asserted of no S. Terms for the positive relation are animal – horse – inanimate, while for the negative relation are human – horse – inanimate, with inanimate being the middle term"[19] (Arist. *Anal. Pr.* Book1, Part 6, 28a30-36).

In the above text Aristotle presents the falsity of the 'ae', 'ee' forms.

The first false example ('ae' form) is made by the triad: animal – horse – human:

animal exists in all humans / horse exists in no human

The second false example ('ae' form) is made by the triad: animal – inaminate – human:

animal exists in all humans / inaminate exists in no human

The third false example ('ee' form) is made by the triad: animal – horse – inaminate:

animal exists in no inaminate / horse exists in no inaminate

The fourth false example ('ee' form) is made by the triad: human – horse - inaminate:

human exists in no inaminate / horse exists in no inaminate

"If P exists in all S and R does not exist in some S. Terms for the universal affirmative relation are animate – human - animal"[20] (Arist. *Anal. Pr.* Book1, Part 6, 28b22-26).

In the above text Aristotle presents the falsity of the 'ao' form.

The fifth false example ('ao' form) is made by the triad: animate – human - animal:

animate exists in all animals / human does not exist in some animals

"Nor is a syllogism possible when both are stated in the negative, but one is universal, the other particular. When the minor is related universally to the middle, take the terms animal – science- wild and animal – human - wild. When the major is related universally to the middle, take as terms for a negative relation raven – snow - white"[21] (Arist. *Anal. Pr.* Book1, Part 6, 28b38-29a3).

In the above text Aristotle presents the falsity of the 'ae', 'ea', 'io' forms.

The sixth false example ('ae' form) is made by the triad: animal – human – wild:

animal exists in all wild (things) / human exists in no wild (thing)

The seventh false example ('ae' form) is made by the triad: animal – science – wild:

animal exists in all wild (things) / science exists in no wild (thing)

The eighth false example ('ea' form) is made by the triad: raven – snow - white:

raven exists in no white (thing) / snow exists in all white (things)

"Nor is a syllogism possible anyhow, if each of the extremes belongs to some of the middle or does not belong, or one belongs and the other does not to some of the middle, or one belongs to some of the middle, the other not to all, or if the premises are indefinite. Common terms for all are animal – human – white and animal – inanimate - white"[22] (Arist. *Anal. Pr.* Book1, Part 6, 29a6-10).

In the above text Aristotle presents the falsity of the 'io' form.

The ninth false example ('io' form) is made by the triad: animal – human – white:

animal exists in some white (things) / human does not exist in some white (things)

The tenth false example ('io' form) is made by the triad: animal – inanimate - white:

animal exists in some white (things) / inaminate does not exist in some white (things)

The predications to be imported in the conceptual scheme in typical formulation are the following:

|Pred.46| [horse] *exists-in-no* [human]
|Pred.47| [inaminate] *exists-in-no* [human]
|Pred.48| [animal] *exists-in-no* [inaminate]
|Pred.49| [horse] *exists-in-no* [inaminate]
|Pred.50| [human] *exists-in-no* [inaminate]
|Pred.51| [animate] *exists-in-all* [animal]
|Pred.52| [human] *does-not-exist-in-some* [animal]
|Pred.53| [animal] *exists-in-all* [wild]
|Pred.54| [human] *exists-in-no* [wild]
|Pred.55| [science] *exists-in-no* [wild]
|Pred.56| [raven] *exists-in-no* [white]
|Pred.57| [snow] *exists-in-all* [white]
|Pred.58| [animal] *exists-in-some* [white] (things)
|Pred.59| [human] *does-not-exist-in-some* [white]
|Pred.60| [inaminate] *does-not-exist-in-some* [white]

Aristotelian.type.5.exists-in-idea

In *Topicorum*[23] Aristotle mentions the Platonic like predication:

motionless [ἠρεμεῖν] exists in the idea of human-himself [αὐτοανθρώπῳ]' ⇔
|Pred.61| [motionless] *exists-in* [human-himself]

4. About the structure of a software ontology

Software ontology is an hierarchical knowledge structure, used as an extension of taxonomy. Taxonomy is a simple hierarchical structure constructed of various levels of a classification tree of classes divided into narrower subclasses. The last level is constituted by specific things (individuals), which are included in one of the narrowest classes. Ontology is based on the structure of taxonomies, but they are equipped by additional tools, such as the possibility of definition of any custom-defined relation between individuals of the same or different classes (named object property), the possibility of definition of any characteristic of the individuals of a class (named datatype property), the possibility of further definition or equivalence of a created class through data restriction creators, addition of annotations including web references to any class or individual, reasoning engines, description logic languages, query languages.

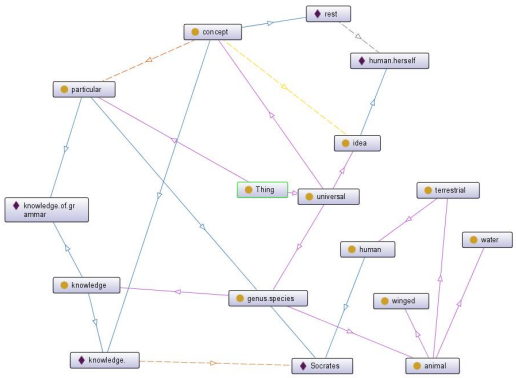
OWL Protégé 4.3[24] is an open software environment for creating and editing ontologies. It includes: classes as groups of similar things, individuals as certain things, object properties, datatype properties, reasoners and description logic capacities, environment for design and execution of queries written in SPARQL -an SQL (Structured Query Language)- for search and retrieval of any term contained in the ontology under any custom-defined query, data restriction environment, annotation tools and helpful visualization tools.

I'll use Protégé 4.3 for importing all the predication type relations of the Aristotelian corpus. The classes will be used for: [1] Aristotelian genera, [2] pool of concepts used in the description of the syllogistic Aristotelian schemes. Object properties will be used in order to represent conspicuously the various types of Aristotelian predications. I'll make an extensive use of Ontograf, a very efficient tool for the analytical visualization of the structure of various parts of the Aristotelian philosophical ontology.

5. Importing the Aristotelian philosophical ontological scheme into the software ontological environment

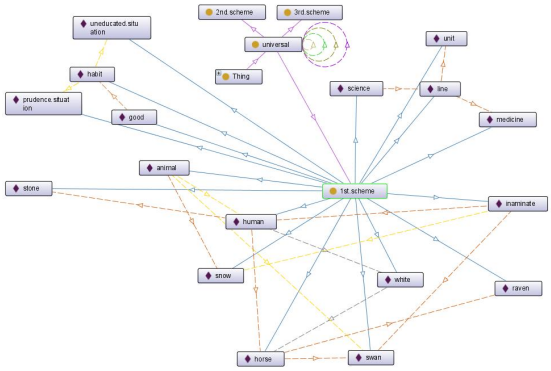
My defined classes concern: [1] the general category of *universals*, which is used as a pool for universals taking part in the relations: *exists-in-all, exists-in-no, exists-in-some, does-not-exist-in-some*. The class of universals includes also the subclasses of genera/species, concepts and ideas, [2] the hierarchical structure of genera/ species connected through the relation *divided-into*, where also the species are *said of* individuals, [3] a pool for qualities (concepts) which are *present in* individuals (relation: *is-in*) or *exist in* ideas, [4] a pool for ideas, in which qualities exist (relation: *exist-in*).

Next picture presents the relations: *divided-into, is-said-of, is-in, exists-in* along with the relative participants.



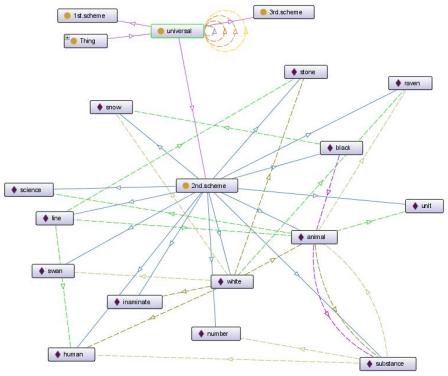
Picture 1. Aristotelian ontology including relations: *divided-into* (purple lines), *is-said-of* (blue lines), *is-in* (brown line), *exists-in* (gray line).

Next picture presents the relations: *exists-in-all, exists-in-no, exists-in-some, does-not-exist-in-some* of the 1st syllogistic scheme, along with the relative participants.



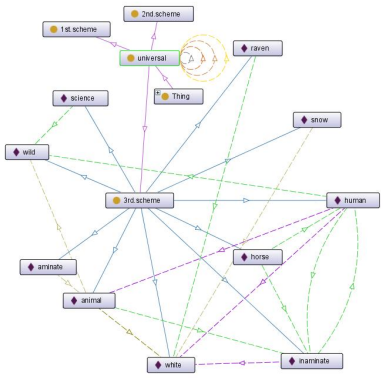
Picture 2. Aristotelian ontology including relations: *exists-in-all* (yellow line), *exists-in-no* (brown line), *exists-in-some* (light yellow line: *good* to *habit*), *does-not-exist-in-some* (gray line) of the 1st syllogistic scheme.

Next picture presents the relations: *exists-in-all, exists-in-no, exists-in-some, does-not-exist-in-some* of the 2nd syllogistic scheme, along with the relative participants.



Picture 3. Aristotelian ontology including relations: *exists-in-all* (light olive line)*, exists-in-no* (green line)*, exists-in-some* (olive line)*, does-not-exist-in-some* (purple line) of the 2nd syllogistic scheme.

Next picture presents the relations: *exists-in-all, exists-in-no, exists-in-some, does-not-exist-in-some* of the 3rd syllogistic scheme, along with the relative participants.



Picture 4. Aristotelian ontology including relations: *exists-in-all* (light olive line)*, exists-in-no* (green line)*, exists-in-some* (olive line)*, does-not-exist-in-some* (purple line) of the 3rd syllogistic scheme.

6. Conclusions

After a detailed analysis of the logical treatises of Aristotelian *Organon*, where various forms of predication are mentioned, I wrote down, through characteristic extracts, the following cases of predication.

The Aristotelian types of predication: predicate *is-said-of** subject (* λέγεται), predicate *is-in** subject (* ἐν τινὶ ἐστὶν), predicate *divided-into* subject, predicate *is-predicated-of** subject (*κατηγορεῖται), predicate *exists-in** subject (* ὑπάρχει τινὶ), predicate *exists-in-all* subject, predicate *exists-in-some* subject, predicate *does-not-exist-in-some* subject, predicate *exists-in-no* subject, predicate *follows-to** subject (*ἀκολουθεῖ τινὶ).

A great number (61) of distinct predications of Ideas have been written down and then imported in a software ontology. This mode of organization is very useful, since the researcher will be able to search for any Idea or any relation of a specific type dispersed in the Aristotelian texts. Additionally some visualisations of parts of the complete Aristotelian conceptual map have been illustrated, as a sample of the great visual opportunities given to any researcher of ancient philosophy who wishes to focus on certain parts of the complex conceptual network of the Aristotelian ontology.

The importance of the clarification of the various types of predication is obvious, since this relation constitutes the core of the art of dialectics and of any attempt to speak about the relation of either the sensibles with the ideas or between the ideas themselves.

This work is open to discussion for any revision or addition concerning the various types of predications mentioned in the works of the two great philosophers of Antiquity.

Lastly, I hope that this work will find continuators in the interdisciplinary areas, since a cooperation between researchers in humanities and informatics would lead to very fruitful results.

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Notes

[1] J. L. Ackrill translation. Original text: "Τῶν ὄντων τὰ μὲν καθ' ὑποκειμένου τινὸς λέγεται, ἐν ὑποκειμένῳ δὲ οὐδενί ἐστιν, οἷον ἄνθρωπος

καθ᾽ ὑποκειμένου μὲν λέγεται τοῦ τινὸς ἀνθρώπου, ἐν ὑποκειμένῳ δὲ οὐδενί ἐστιν· τὰ δὲ ἐν ὑποκειμένῳ μέν ἐστι, καθ᾽ ὑποκειμένου δὲ οὐδενὸς λέγεται, ἐν ὑποκειμένῳ δὲ λέγω ὃ ἔν τινι μὴ ὡς μέρος ὑπάρχον ἀδύνατον χωρὶς εἶναι τοῦ ἐν ᾧ ἐστίν, οἷον ἡ τὶς γραμματικὴ ἐν ὑποκειμένῳ μέν ἐστι τῇ ψυχῇ, καθ᾽ ὑποκειμένου δὲ οὐδενὸς λέγεται, καὶ τὸ τὶ λευκὸν ἐν ὑποκειμένῳ μέν ἐστι τῷ σώματι, ἅπαν γὰρ χρῶμα ἐν σώματι, καθ᾽ ὑποκειμένου δὲ οὐδενὸς λέγεται· τὰ δὲ καθ᾽ ὑποκειμένου τε λέγεται καὶ ἐν ὑποκειμένῳ ἐστίν, οἷον ἡ ἐπιστήμη ἐν ὑποκειμένῳ μέν ἐστι τῇ ψυχῇ, καθ᾽ ὑποκειμένου δὲ λέγεται τῆς γραμματικῆς· τὰ δὲ οὔτε ἐν ὑποκειμένῳ ἐστὶν οὔτε καθ᾽ ὑποκειμένου λέγεται, οἷον ὁ τὶς ἄνθρωπος ἢ ὁ τὶς ἵππος, οὐδὲν γὰρ τῶν τοιούτων οὔτε ἐν ὑποκειμένῳ ἐστὶν οὔτε καθ᾽ ὑποκειμένου λέγεται· ἁπλῶς δὲ τὰ ἄτομα καὶ ἓν ἀριθμῷ κατ᾽ οὐδενὸς ὑποκειμένου λέγεται, ἐν ὑποκειμένῳ δὲ ἔνια οὐδὲν κωλύει εἶναι· ἡ γὰρ τὶς γραμματικὴ τῶν ἐν ὑποκειμένῳ ἐστίν”.

[2] Marc Cohen, *Predication and Ontology: The Categories,* https:// faculty. washington.edu/smcohen/320/cats320.htm

[3] The cases of a quality in the position of the subject and a secondary substance in the position of the predicate, though are not frequently met, appear in *Prior Analytics*: “take some of the white things of which man is not predicated“ [*ὧν μὴ κατηγορεῖται λευκῶν ὁ ἄνθρωπος*] (Arist. *Anal. Pr.*, 26b7-8)

[4] I prefer to use the term ‘particular’ (kath᾽ hekaston/ *καθ᾽ ἕκαστον*) as opposed to ‘universal’ (katholou/ *καθόλου*). I could also use the term ‘individual’, as other researchers, but there is a little difference, according to some Aristotelian passages, between the two terms, since an individual (tode ti/ *τόδε τι*) is not excluded to be a universal. What makes something a *tode ti* is its nature as a fully determinate thing, not further differentiable; what makes something a kath᾽ hekaston is its nature as a particular thing, unrepeatable, and not predicated of anything else (Stanford Encyclopedia of Philosophy: *Aristotle’s Metaphysics*)

[5] (Translation into English is mine) «Ἐπεὶ δέ ἐστι τὰ μὲν καθόλου τῶν πραγμάτων τὰ δὲ καθ᾽ ἕκαστον, — λέγω δὲ καθόλου μὲν ὃ ἐπὶ πλειόνων πέφυκε κατηγορεῖσθαι, καθ᾽ ἕκαστον δὲ ὃ μή, οἷον ἄνθρωπος μὲν τῶν καθόλου Καλλίας δὲ τῶν καθ᾽ ἕκαστον»

[6] «Ἀντιδιῃρῆσθαι δὲ λέγεται ἀλλήλοις τὰ κατὰ τὴν αὐτὴν διαίρεσιν, οἷον τὸ πτηνὸν τῷ πεζῷ καὶ τῷ ἐνύδρῳ· ταῦτα γὰρ ἀλλήλοις ἀντιδιῄρηται ἐκ τοῦ αὐτοῦ γένους ὄντα· τὸ γὰρ ζῷον διαιρεῖται εἰς ταῦτα, εἴς τε τὸ πτηνὸν καὶ τὸ πεζὸν καὶ τὸ ἔνυδρον»

[7] (translation into English of this and the following passages by A. J. Jenkinson, with changes in critical terms) «εἰ γὰρ τὸ Α κατὰ παντὸς τοῦ Β καὶ τὸ Β κατὰ παντὸς τοῦ Γ, ἀνάγκη τὸ Α κατὰ παντὸς τοῦ Γ κατηγορεῖσθαι· πρότερον γὰρ εἴρηται πῶς τὸ κατὰ παντὸς λέγομεν. ὁμοίως δὲ καὶ εἰ τὸ μὲν Α κατὰ μηδενὸς τοῦ Β, τὸ δὲ Β κατὰ παντὸς τοῦ Γ, ὅτι τὸ Α οὐδενὶ τῷ Γ ὑπάρξει»

[8] «εἰ δὲ τὸ μὲν πρῶτον παντὶ τῷ μέσῳ ἀκολουθεῖ, τὸ δὲ μέσον μηδενὶ τῷ ἐσχάτῳ ὑπάρχει, οὐκ ἔσται συλλογισμὸς τῶν ἄκρων· οὐδὲν γὰρ ἀναγκαῖον συμβαίνει τῷ ταῦτα εἶναι· καὶ γὰρ παντὶ καὶ μηδενὶ ἐνδέχεται τὸ πρῶτον τῷ ἐσχάτῳ ὑπάρχειν, ὥστε οὔτε τὸ κατὰ μέρος οὔτε τὸ καθόλου γίνεται ἀναγκαῖον· μηδενὸς δὲ ὄντος ἀναγκαίου διὰ τούτων οὐκ ἔσται συλλογισμός. ὅροι τοῦ παντὶ ὑπάρχειν ζῷον – ἄνθρωπος – ἵππος, τοῦ μηδενὶ ζῷον – ἄνθρωπος – λίθος… ὅροι τοῦ ὑπάρχειν ἐπιστήμη – γραμμή – ἰατρική, τοῦ μὴ ὑπάρχειν ἐπιστήμη – γραμμή – μονάς».

[9] « Ἐὰν δὲ πρὸς τὸ ἔλαττον ἄκρον τὸ καθόλου τεθῇ ἢ κατηγορικὸν ἢ στερητικόν, οὐκ ἔσται συλλογισμός, οὔτε καταφατικοῦ οὔτε ἀποφατικοῦ τοῦ ἀδιορίστου ἢ κατὰ μέρος ὄντος, οἷον εἰ τὸ μὲν Α τινὶ τῷ Β ὑπάρχει ἢ μὴ ὑπάρχει, τὸ δὲ Β παντὶ τῷ Γ ὑπάρχει• ὅροι τοῦ ὑπάρχειν ἀγαθόν – ἕξις – φρόνησις, τοῦ μὴ ὑπάρχειν ἀγαθόν – ἕξις – ἀμαθία. πάλιν εἰ τὸ μὲν Β μηδενὶ τῷ Γ, τὸ δὲ Α τινὶ τῷ Β ἢ ὑπάρχει ἢ μὴ ὑπάρχει ἢ μὴ παντὶ ὑπάρχει, οὐδ᾽ οὕτως ἔσται συλλογισμός. ὅροι λευκόν – ἵππος – κύκνος, λευκόν – ἵππος – κόραξ».

[10] « Οὐδ᾽ ὅταν τὸ μὲν πρὸς τῷ μείζονι ἄκρῳ καθόλου γένηται ἢ κατηγορικὸν ἢ στερητικόν, τὸ δὲ πρὸς τῷ ἐλάττονι στερητικὸν κατὰ μέρος, οὐκ ἔσται συλλογισμός [ἀδιορίστου τε καὶ ἐν μέρει ληφθέντος], οἷον εἰ οἷον εἰ τὸ μὲν Α παντὶ τῷ Β ὑπάρχει, τὸ δὲ Β τινὶ τῷ Γ μή, ἢ εἰ μὴ παντὶ ὑπάρχει... ὑποκείσθωσαν γὰρ οἱ ὅροι ζῷον – ἄνθρωπος – λευκόν• εἶτα καὶ ὧν μὴ κατηγορεῖται λευκῶν ὁ ἄνθρωπος, εἰλήφθω κύκνος καὶ χιών• οὐκοῦν τὸ ζῷον τοῦ μὲν παντὸς κατηγορεῖται, τοῦ δὲ οὐδενός, ὥστε οὐκ ἔσται συλλογισμός. πάλιν τὸ μὲν Α μηδενὶ τῷ Β ὑπαρχέτω, τὸ δὲ Β τινὶ τῷ Γ μὴ ὑπαρχέτω• καὶ οἱ ὅροι ἔστωσαν ἄψυχον – ἄνθρωπος – λευκόν· εἶτα εἰλήφθωσαν, ὧν μὴ κατηγορεῖται λευκῶν ὁ ἄνθρωπος, κύκνος καὶ χιών• τὸ γὰρ ἄψυχον τοῦ μὲν παντὸς κατηγορεῖται, τοῦ δὲ οὐδενός».

[11] «Ὅταν δὲ τὸ αὐτὸ τῷ μὲν παντὶ τῷ δὲ μηδενὶ ὑπάρχῃ, ἢ ἑκατέρῳ παντὶ ἢ μηδενί, τὸ μὲν σχῆμα τὸ τοιοῦτον καλῶ δεύτερον, μέσον δὲ ἐν αὐτῷ λέγω τὸ κατηγορούμενον ἀμφοῖν, ἄκρα δὲ καθ᾽ ὧν λέγεται τοῦτο, μεῖζον δὲ ἄκρον τὸ πρὸς τῷ μέσῳ κείμενον· ἔλαττον δὲ τὸ πορρώτερο τοῦ μέσου. τίθεται δὲ τὸ μέσον ἔξω μὲν τῶν ἄκρων, πρῶτον δὲ τῇ θέσει».

[12] «ἐὰν δὲ τὸ Μ παντὸς τοῦ Ν καὶ τοῦ Ξ κατηγορῆται, οὐκ ἔσται συλλογισμός. ὅροι τοῦ ὑπάρχειν οὐσία – ζῷον – ἄνθρωπος, τοῦ μὴ ὑπάρχειν οὐσία – ζῷον – ἀριθμός· μέσον οὐσία. οὐδ᾽ ὅταν μήτε τοῦ Ν μήτε τοῦ Ξ μηδενὸς κατηγορῆται τὸ Μ. ὅροι τοῦ ὑπάρχειν γραμμή – ζῷον – ἄνθρωπος, τοῦ μὴ ὑπάρχειν γραμμή – ζῷον – λίθος»

[13] «ὅροι ζῷον – οὐσία – κόραξ, ζῷον – λευκόν – κόραξ. οὐδ᾽ ὅταν τοῦ μὲν Ξ μηδενός, τοῦ δὲ Ν τινός. ὅροι τοῦ ὑπάρχειν ζῷον – οὐσία – μονάς, τοῦ μὴ ὑπάρχειν ζῷον – οὐσία – ἐπιστήμη»

[14] «οἷον τὸ Μ τῷ μὲν Ν μηδενὶ τῷ δὲ Ξ τινὶ μὴ ὑπαρχέτω· ἐνδέχεται δὴ καὶ παντὶ καὶ μηδενὶ τῷ Ξ τὸ Ν ὑπάρχειν. ὅροι τοῦ μὲν μὴ ὑπάρχειν μέλαν – χιών – ζῷον»

[15] «οἷον τὸ Μ τῷ μὲν Ν παντὶ τῷ δὲ Ξ τινὶ ὑπαρχέτω. ἐνδέχεται δὴ τὸ Ν τῷ Ξ καὶ παντὶ καὶ μηδενὶ ὑπάρχειν. ὅροι τοῦ μηδενὶ ὑπάρχειν λευκόν – κύκνος – λίθος»

[16] « τὸ Μ τῷ μὲν Ξ μηδενὶ τῷ δὲ Ν τινὶ μὴ ὑπάρχει, ἐνδέχεται τὸ Ν τῷ Ξ καὶ παντὶ καὶ μηδενὶ ὑπάρχειν. ὅροι τοῦ ὑπάρχειν λευκόν – ζῷον – κόραξ, τοῦ μὴ ὑπάρχειν λευκόν – λίθος – κόραξ. εἰ δὲ κατηγορικαὶ αἱ προτάσεις, ὅροι τοῦ μὴ ὑπάρχειν λευκόν – ζῷον – χιών, τοῦ ὑπάρχειν λευκόν – ζῷον – κύκνος»

[17] «ἀλλ᾽ οὐδ᾽ εἰ τινὶ ἑκατέρῳ ὑπάρχει ἢ μὴ ὑπάρχει, ἢ τῷ μὲν τῷ δὲ μή, ἢ μηδετέρῳ παντί, ἢ ἀδιορίστως. ὅροι δὲ κοινοὶ πάντων λευκόν – ζῷον – ἄνθρωπος, λευκόν – ζῷον – ἄψυχον»

[18] «Ἐὰν δὲ τῷ αὐτῷ τὸ μὲν παντὶ τὸ δὲ μηδενὶ ὑπάρχῃ, ἢ ἄμφω παντὶ ἢ μηδενί, τὸ μὲν σχῆμα τὸ τοιοῦτον καλῶ τρίτον, μέσον δ᾽ ἐν αὐτῷ λέγω καθ᾽ οὗ ἄμφω τὰ κατηγορούμενα, ἄκρα δὲ τὰ κατηγορούμενα, μεῖζον δ᾽ ἄκρον τὸ πορρώτερον τοῦ μέσου, ἔλαττον δὲ τὸ ἐγγύτερον. τίθεται δὲ τὸ μέσον ἔξω μὲν τῶν ἄκρων, ἔσχατον δὲ τῇ θέσει».

[19] «ἐὰν δὲ τὸ μὲν Ρ μηδενὶ τὸ δὲ Π παντὶ ὑπάρχῃ τῷ Σ, οὐκ ἔσται συλλογισμός. ὅροι τοῦ ὑπάρχειν ζῷον – ἵππος – ἄνθρωπος, τοῦ μὴ ὑπάρχειν ζῷον – ἄψυχον – ἄνθρωπος. οὐδ᾽ ὅταν ἄμφω κατὰ μηδενὸς τοῦ Σ λέγηται, οὐκ ἔσται συλλογισμός. ὅροι τοῦ ὑπάρχειν ζῷον – ἵππος – ἄψυχον, τοῦ μὴ ὑπάρχειν ἄνθρωπος – ἵππος – ἄψυχον»

[20] «οἷον εἰ τὸ μὲν Π παντὶ τῷ Σ, τὸ δὲ Ρ τινὶ τῷ Σ μὴ ὑπάρχει. ὅροι τοῦ παντὶ ὑπάρχειν ἔμψυχον – ἄνθρωπος – ζῷον»

[21] «οὐδ᾽ ὅταν ἀμφότεροι στερητικοὶ τεθῶσιν, ᾗ δ᾽ ὁ μὲν καθόλου ὁ δ᾽ ἐν μέρει. ὅροι ὅταν ὁ ἐλάττων ᾖ καθόλου πρὸς τὸ μέσον, ζῷον – ἐπιστήμη – ἄγριον, ζῷον – ἄνθρωπος – ἄγριον· ὅταν δ᾽ ὁ μείζων, τοῦ μὲν μὴ ὑπάρχειν κόραξ – χιών – λευκόν»

[22] «Οὐδ᾽ ἂν ἑκάτερος τινὶ τῷ μέσῳ ὑπάρχῃ ἢ μὴ ὑπάρχῃ, ἢ ὁ μὲν ὑπάρχῃ ὁ δὲ μὴ ὑπάρχῃ, ἢ ὁ μὲν τινὶ ὁ δὲ μὴ παντί, ἢ ἀδιορίστως, οὐκ ἔσται συλλογισμὸς οὐδαμῶς. ὅροι δὲ κοινοὶ πάντων ζῷον – ἄνθρωπος – λευκόν, ζῷον – ἄψυχον – λευκόν»

[23] “inasmuch as 'being motionless' does not exist in 'human-himself' qua 'human', but qua 'idea', it could not be a property of 'man' to be motionless” [*οἷον ἐπεὶ αὐτοανθρώπῳ οὐχ ὑπάρχει τὸ ἠρεμεῖν ᾗ ἄνθρωπός ἐστιν, ἀλλ᾽ ᾗ ἰδέα, οὐκ ἂν εἴη ἀνθρώπου ἴδιον τὸ ἠρεμεῖν*]» (Arist. *Topicorum*. Book V, Part.7)

[24] Protégé tutorial: https://buildmedia.readthedocs.org/media/pdf/go-protege-tutorial/latest/go-protege-tutorial.pdf
http://mowl-power.cs.man.ac.uk/protegeowltutorial/resources/ProtegeOWLTutorialP3_v1_0.pdf