QUADRI DIMENSIONAL INTERPRETATION OF SYLLOGISTIC INFERENTIAL PROCESSES IN POLYVALENT LOGIC, WITH A VIEW TO STRUCTURING CONCEPTS AND ASSERTIONS FOR REALIZING THE UNIVERSAL KNOWLEDGE BASIS

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Abstract

Modelling syllogistic - inferential processes in polyvalent logic by diachronic syllogistic structures, we realise their QUADRI DIMENSIONAL interpretation, in the paper, by relational - objectual - propertational chains convergent in diachronic spaces. Aristotle considered the definition the motor nerve of syllogistic deduction, the medium term being a definition. Leibnitz conceived the definition as the beginning and end of any demonstration, a demonstration being nothing but a chain of definition.The concept of structure, implying a topological relational approach designates the necessary relations between the elements of a system, invariant and independent of the of the elements, therefore formalizable the structure constituting an abstract model capable of making the rules, governing the transformations, rationally intelligible. Structuring the concepts and the assertions of scientific theories according to the rules of syllogistic definability and deductibility systems are obtained, which underlie the realization of the Universal Knowledge Basis.

Keywords inferential process, syllogism, logic, knowledge basis, formalism

1. Theoretical Basis. Conceptualizations. Formalization.

1.1. Axioms - The Fundamentals Of Aristotelian Syllogistic Construction.

Aristotle was the first to formulate ideas on the deductive method of logic. Transposing his ideas in the world of current concepts, by deductive science, Aristotle understands a system S of notions and sentences made up so that:

a) all the sentences in the system S should refer to one and the same domain of objects and relations between objects;

b) any sentences in the system S can be a true sentences;

c) if certain sentences belong to the system S, then other sentences which can be deduced from them according to the laws of logic have to belong to the system S;

d) a finite set of notions should be given in the system S, so that their meaning should not need any explanation, while the meaning of the remaining notions in the system should be defined with the aid of the first group of notions;

e) in the system S a finite number of sentences should be given which are constructed in a such a way that their truth should be evident, while any other sentence in S could be deduced from these sentences according to the laws of logic. The sentences whose truth is evident and which are placed ahead a deductive system are called axioms in traditional logic. The axioms were taken by Aristotle as fundamentals of his syllogistic.

Wang Hao consider that any scientific theory comprises a body of concepts and a large number of assertions.

The meaning of a concept can be explained or defined by means of other concepts.

The truth of an assertion can be determined by deducing it from other accepted assertions. When the concepts and the sentences of a theory are arranged according to the definability and deductibility relations, an axiomatic system of theory is obtained.

1.2 On Structure And Structural Analysis Rules

The structure concepts designates "the constellation"of necessary invariant relations, independent of the elements, therefore formalizable, which offer the "code" explanation to all the possible transformations within the given system.

By constructing abstract models, invariant relations are detected, which can explain the system physiognomy and dynamics.

J.Piaget considers the structure of a system as an ensemble of coherent transformations, which ensures the self - regulation of a totality.

Through the structure concept, as an abstract model, the rules governing the transformations and ensuring a system functionality become rationally intelligible.

In the methodological strategy of structuralism, the rule of diachronic, variation enables explaining the system variations by structural invariants.

A distinction is made between "synchronic" designating the relationship between successive terms, therefore structural analysis lies in a topological and relational approach.

Applying the structural analysis rules, and first of all the immanence rule, the analysis is exclusively focused inside the domain under investigation, operating temporarily, for methodological reasons, a closing of the respective domain.

The internal structure of a domain of knowledge is established not on the basis of resemblances but of differences, by grouping and ordering differences more exactly binary opposition, where the relations between the elements are of complementarity.

1.3. The Principle of Sufficient Reason

Leibniz elaborates the principle of sufficient reason and formulates it as follows:"The meaning of sufficient reason (Raison suffisante) is that no fact can be considered true or sufficient and no sentence can be considered true without the existence of a sufficient motivation for why it is like this and not otherwise".

Schoppenhauer consecrated to this principle the paper entitled "The Quadruple Root of Sufficient Reason", in which he distinguishes the following forms of this principle: the principle of sufficient reason of existence, of becoming, of knowledge and of action, involving the following aspects: existence, cause, knowledge and motive.

1.4 Scientia Generalis

Leibniz, by elaborating "characteristica universalis", i.e. "a general system of signs and formulae" so that in a certain scientific system to each object relationship corresponds a sign, believed in the possibility of constructing a general science.

Within the frame of this science, named "scientia generalis", the principles of the "general methodology" of sciences can be elaborated.

1.5 Sematic Steps

The theory of semantic steps in Semiotic starts from the fact that there are objects, properties and relations which belong to objective reality approached to as a knowledge field.

The objects of the first step which have a corresponding formalization in an object language, constitute the so - called zero steps.

The languages from the second step on, will be called metalanguages and they serve to the formalization of objects on superior steps. The objects, properties and relations of the zero step form the basis of the whole sequence of steps of human knowledge

However, from the theory of types, it follows that any property belongs to a higher step than the objects having that property.

1.6. The Intention And Extension Of Notions

Any notion has two fundamental determinations which are connected, namely the extension and the intension of the notion.

Notions reflect classes of things. The reflection of a class of objects in a notion is called notion extension.

The intension of a notion means the abstract reflection of the invariable properties and relations of a certain class of object.

1.7 Immediate Interferences. Syllogisms

Immediate interferences or interferences lie in obtaining a new sentence from a single proposition. *According to Aristotle a syllogism consist in inferring a sentence from other two sentences.*

1.8 Arborescent Graph. Taxonomy

An arborescent graph is a particular graph in which there is a peak called root, so that any peak of the graph of the graph is linked with S by a unique route.

The arborescent graph is also known as tree. Taxonomy or taxonomic arborescent graph is a graph in which there are inherited proprieties.

The construction of a taxonomy enables the system to know that an element has, besides its own proprieties, the proprieties of all its precursors in the graph. Taxonomy is used for a hierarchized graph.

1.9. The Relationship Between Structure And Genesis

Structural analysis constitutes a starting point to a historical analysis and from a genetic perspective, structure itself becomes comprehensive; the dialectic method is seen as unity of structural - functional analysis of historical - genetic analysis implying the study of the origin and evolution of the corresponding structures as the historical product of a self-governing equilibrating process, structural coherence emerging not as static reality but as dynamic virtuality.

Structural analysis correlated with historical - genetic analysis explains the transition from one structure to another.

Each system has a definite structure that includes the resources of surpassing itself.

1.10. The Knowledge Basis

The knowledge basis can be considered as a n - dimensional topological space, on which a geometry can be defined and within it concepts of open sets and contact neighbourhood, frontier, continuity and topological transformation are operand.

The metric space of the knowledge basis should not be limited only to the level of forms detected in the real space but to that of notions.

The information stored in the knowledge basis must be organized in sets or classes (O_{ik}); the totality of classes O_{ik} forms the knowledge or the references structure of intelligent systems, there being the relation:

$$\begin{gathered} O_{ik} \neq O_{ik+1} \\ O_{ik} \cap O_{ik-1} = \phi \end{gathered} \tag{1}$$

for any O_{ik}, O_{ik+1}, where $\varnothing$ is a void set.

In real conditions, relation (1) is not observed and the class delimitation is vague, the sets defining the classes are "fuzzy" in Zadeh's opinion or "fluid" according to the definition given Gentilhome.

The classes $\{O_{ik}\}$ in the knowledge basis are not equivalent, there being a level sequence of classes of increasing power beginning with the uniques and ending with the reference set $\{O_{00}\}$.

An algebra of relations can be defined of the knowledge basis for the forms of intellectual activity; the relations can realize an application of the knowledge basis in the knowledge basis enable its description under the form of a graph.

2. Modelling Syllogistic - Inferential Processes by Diachronic Syllogistic Structures

2.1. Methodological Principles

1° The principle of convergence to "Axiomatic One". Any structure tends and converges ascending to "Axiomatic One" which is associated to the object O_{00} (fig. 1).

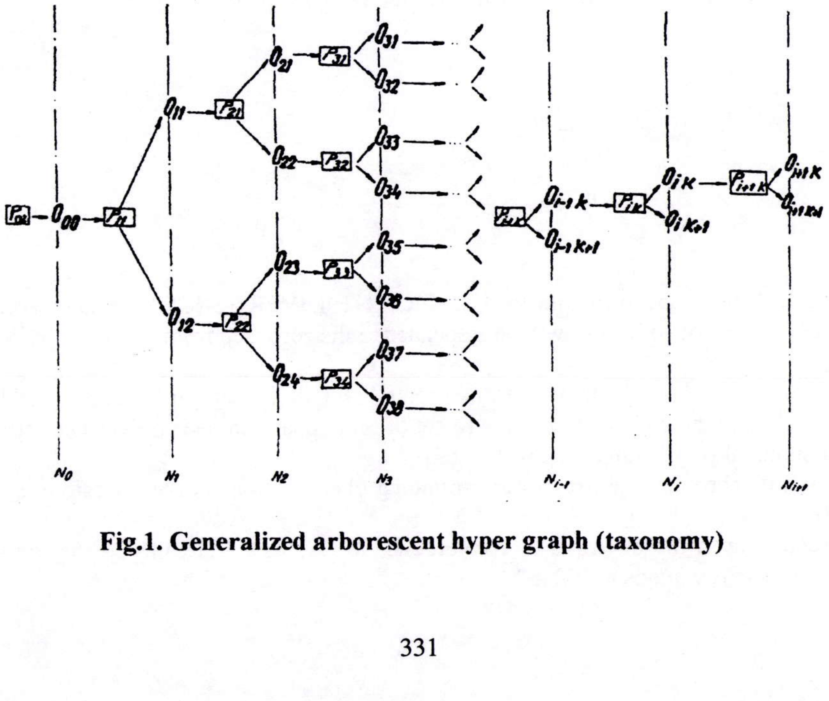


Fig.1. Generalized arborescent hyper graph (taxonomy)

2° The principle of "Sufficient Divergence". Any structure as descending divergent on an unlimited number of levels; for it to be intelligible, a finite number of descendence levels is sufficient.

2.2. Generalized Syllogistic Hyper graph

The generalized syllogistic graph represents the model of the most general diachronic structures, constituted of structure - diachronic cells; it is elaborated by superposing three arborescent structures:

1) of proprieties
2) of diachronic and synchronic relations
3) of objects

2.3. The Diachronic Space

Descartes was the first to raise the problem of the coordinate besides of space and time.

This paper introduce an extra coordinate besides space and time, namely diachrony, and we shall name diachronic hyper Cartesian space the limitless ensemble of diachronic levels, consisting of a sequence of levels (N_i); each diachronic level has a corresponding "step" in the becoming of the UNIVERSE.

The references system of diachronic space contains the axes of diachrony and syncrony.

The axis of diachrony represents the history of the becoming UNIVERSE, and the axis of synchrony represents UNIVERSE S existing in space time.

2.3.1 The universal parameters of diachronic space

The diachronic space is characterized by the following universal parameters:

1° - diachronic levels (N_i);
2° - the quantity of information corresponding to level (I_i);
3° - level probability (p_i);
4° - equivalence class or level cardinal number (n_i)

$$n_i = 2^{N_i}$$
$$p_i = \frac{1}{2^{N_i}} \tag{2}$$
$$I_i = \log_2 2^{N_i}$$

According to the principle of "SUFFICIENT DIVERGENCE" the last level in the "SUFFICIENT" number of levels, will be associated to the zero step from the theory of semantic steps (N_i).

Considering the objects on the diachronic levels to be sets, applications: Π_i:U⟶U/ρ_i defined by $\Pi_i=\rho_i$, where U is an universe (a set of sets), ρ_i are unique equivalences specific to named cannonical projection of equivalences ρ_i.

Each diachronic level has a corresponding class of equivalence, therefore a cardinal number (n_i).

According to the principle of convergence to "AXIOMATIC ONE", the limit of the cardinal numbers row tends to "ONE".

As cardinal numbers are classes of equivalence, which imply binary equivalence relations defined in Cartesian spaces, the diachronic space constitutes a "hyper cartesian" space.

2.4 Structural diachronic cell

The structural diachronic cell will be defined as a minimal quadri - property, three - objects, three - relation set (fig. 2).

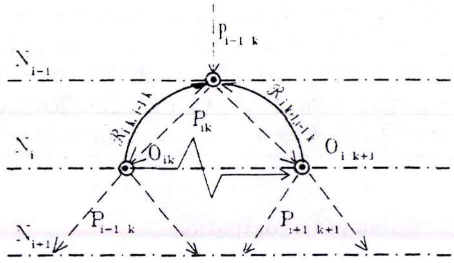


Fig. 2 Structural - Diachronic Cell

Mathematically, the structural - diachronic cell is defined as the set of the three minimal property - object - relation sets, as follows:

$$\begin{aligned}&\{\{p_{i-1k}, p_{ik}, p_{i-1k}, p_{i-1k-1}\}, \{o_{i-1k}, o_{ik}, o_{ik-1}\},\\&\{R_{ik\ i-1k}, R_{ik-1\ i-1k}, R_{ik\ ik-1}\}\}\end{aligned} \tag{3}$$

The structural diachronic cell can be modelled mathematically by three elementary matrices:

1.- the property - elementary matrix

$$\begin{bmatrix} P_{i-1\ k} & \\ p_{ik} & \\ P_{i-1\ k-1} & P_{i-1\ k-1} \end{bmatrix} \tag{4}$$

2. - the object - elementary matrix

$$\begin{bmatrix} O_{i-1} & \\ O_{ik} & O_{i\ k-1} \end{bmatrix} \tag{5}$$

3. - the relation - elementary matrix

$$\begin{bmatrix} R_{ik\ i-1k} & R_{ik-1\ i-1k} \\ [R_{ik\ ik-1}] & \end{bmatrix} \tag{6}$$

2.5 The triangle of the three logic principles

From figure 2 the structural - diachronic cell it can be noticed that being given a precursor object O_{i-1k} (a UNIVERSE or a set of sets), it can be divided into two and only two successor objects, O_{ik} and O_{ik-1} (two sets of sets) according to the principle of the "excluded tertiary"so that the two descendant objects (successor) should necessary be in a relation of contradiction according to the principle of the "EXCLUDED CONTRADICTION"; leaving aside property P_{ik}, between the two (resulting) objects there is a relation of equivalence according to the "IDENTITY" principle (fig.3).

2.6 Diachronic interpretation of the definition

In mathematical logic, the notion of definition was introduced by the symbol "$=_{Df}$" placed between two symbolic expressions, specifying that the two symbolic expressions are represented by the term "definiens" and the term "definiendum".

The notion of definition was accepted in mathematical logic in a vague and unprecise manner.

B.Russel had to affirm "the definition is not definable ant it is not even a definite notion".

We shall consider that the sign "$=_{Df}$" as a sign of definition is a relation between the expression that defines (definiens) and the defined expression (definiendum), relation which can be true or false.

Assimilating "genus proximum" with the object O_{i-1k} and "differentia specifica" with the property P_{ik} (in the syllogistic hyper graph) and denoting definiendum by D and definiens by d, the definition relation:

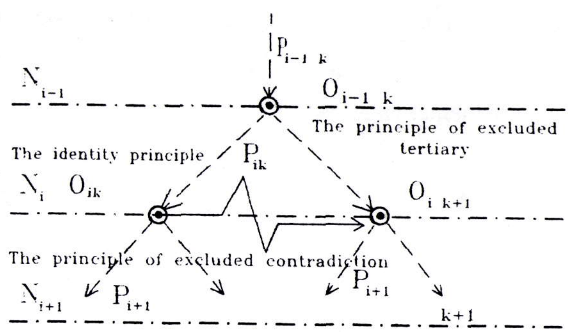


Fig. 3 The triangle of the logic principles

$D =_{Df} d$, can be interpreted in the following way

$O_{ik} =_{Df} O_{i-1k}$, if all the elements of the objects O_{ik} have the property P_{ik} (fig.4).

It can be noticed from fig.4 that the definition implies 2 diachronic levels (N_{i-1}, N_i), two objects (O_{i-1k} and O_{ik}) and a property P_{ik} and a property P_{ik} and it has an ascendent direction.

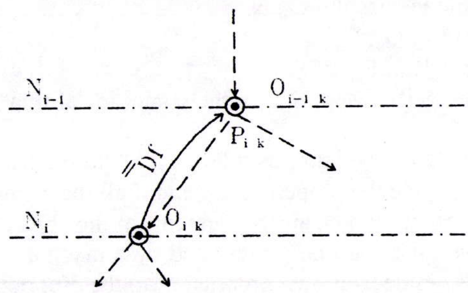


Fig. 4 Diachronic interpretation of the definition

2.7 Quadri Dimensional Interpretation Of Syllogisms/inferences

Let us consider the following inferences/syllogisms.

1. If all spruce firs are Plants an if all Plants are Organisms then all the spruce firs are Organisms.

2. If all the Philosophers are People and if all the People are Social Beings then all Philosophers are Social Beings, by replacing the notions comprised in the two inferences by symbols, the general inferences shall be obtained:

If all S are M
and if all M are P
then all S are P.

Associating the notion ALL by a cardinal number or an equivalent class, it results that notions S, M, P, can be associated with a sequence of three objects (O_{i-1j}, O_{ik}, O_{i+1k}) in a diachronic structure (fig. 5).

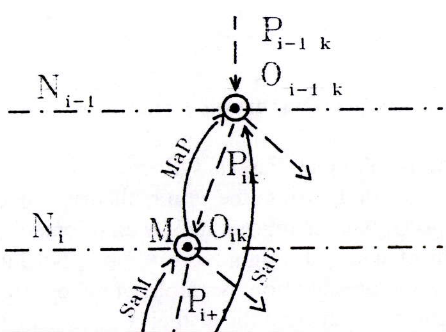


Fig. 5 QUADRI DIMENSIONAL interpretation of the syllogisms/inferences

From fig.5 it results that the general inference can be interpreted quadri dimensionally as it implies:

1 - three diachronic levels: N_{i-1}, N_i, N_{i-1};

2 - three objects: O_{i-1k}, O_{ik}, O_{i+1k};

3 - three properties: P_{i-1k}, P_{ik}, P_{i-1k};

4 - three relations: SaM, Map, SaP (a the vomel in "afirma" wich replaces the notion "are").

The general inference can be stated as follows: if all the elements of the object $O_{i+1\,k}$ (set) on the diachronic level N_{i+1} have the property P_{i-1k}, and if all the elements of the object O_{ik} (set) on the level N_i have the property P then all the elements of the object $O_{i+1\,k}$ have the property P.

Therefore, the syllogism can be represented by a taxonomic arborescent structure in which the elements posses beside their own proprieties all the proprieties of the precursor in the graph. Returning to the two concrete inferences and writing down:

Pruce trees - M		Philosopher - F
Plants - P	and respectively	People - Man
Organisms - O		Sociable beings - FS;

we shall obtain the following diachronic structures respectively QUADRI DIMENSIONAL interpretations (fig.6).

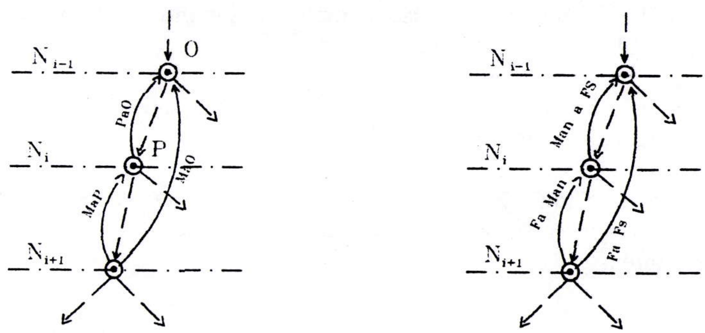


Fig. 6 Diachronic structures

By assimilating notions to object classes, syllogistic figures, respectively Aristotelian syllogistic modes can be modelled, using the graph theory. To each syllogistic mode it corresponds a mathematic model wich is represented by an oriented graph of binary three type arborescent structure (graphs of syllogistic figures No 1, No 2, No 3 and No 4).

From the analysis of the representation by graphs of syllogistic modes corresponding to Aristotelian syllogistic figures it can be noticed that a syllogism in a diachronic structure occupies three and respectively four diachronic levels (N_{i-1}, N_i, N_{i+1}, N_{i+2}), among the objects on the various levels the following relations being established:

1. direct diachronic relations - binary relations between two objects on two successive diachronic levels ($R_{i-1\,k,ik}$);

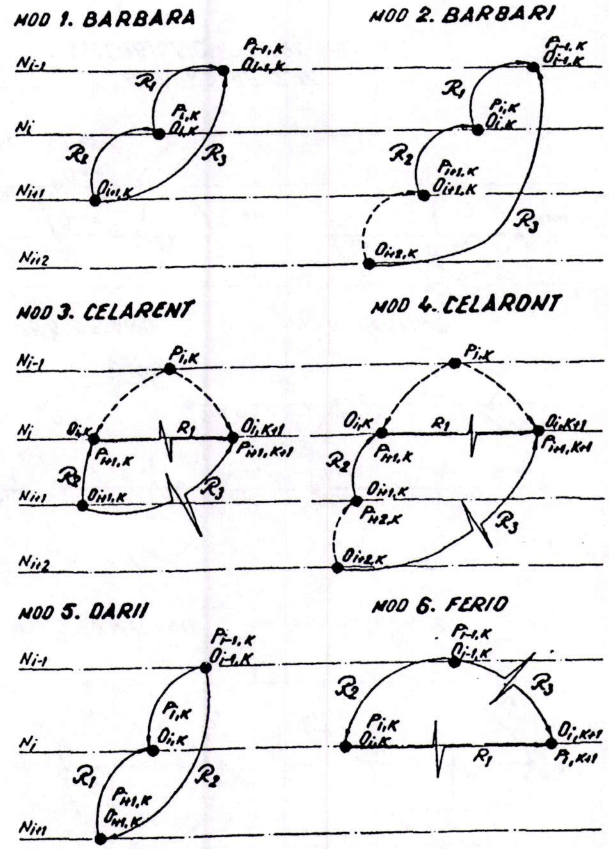
2. transcendental diachronic relations - binary relations between two objects which are not on two successive diachronic levels (e.g. $R_{i+1\,k,I-1k}$);

3. synchronic relations of contradiction - binary relations between two successive

SYLLOGISTIC FIGURE No. 1

TABLE 1

CRT. NO.	SYLLOGISTIC MODES	RELATIONAL-OBJECTUAL PROPERTATIONAL INTERPRETATION
1.	MOD 1 BARBARA	$\mathcal{R}_1 = O_{i,k} \; a \; O_{i-1,k}$ $\mathcal{R}_2 = O_{i+1,k} \; a \; O_{i,k}$ $\mathcal{R}_3 = O_{i+1,k} \; a \; O_{i-1,k}$ $P_{i-1,k} \wedge P_{i,k} \longrightarrow P_{i+1,k}$
2.	MOD 2 BARBARI	$\mathcal{R}_1 = O_{i,k} \; a \; O_{i-1,k}$ $\mathcal{R}_2 = O_{i+1,k} \; a \; O_{i,k}$ $\mathcal{R}_3 = O_{i+1,k} \; i \; O_{i-1,k}$ $\mathcal{R}_3' = O_{i+2,k} \; a \; O_{i-1,k}$ $P_{i-1,k} \wedge P_{i,k} \wedge P_{i+1,k} \longrightarrow P_{i+2,k}$
3.	MOD 3 CELARENT	$R_1 = O_{i,k} \; e \; O_{i,k+1}$ $\mathcal{R}_2 = O_{i+1,k} \; a \; O_{i,k}$ $\mathcal{R}_3 = O_{i+1,k} \; e \; O_{i,k+1}$ $P_{i+1,k} \wedge \overline{P_{i,k}} \Longrightarrow \overline{P_{i+1,k+1}}$
4.	MOD 4 CELARONT	$R_1 = O_{i,k} \; e \; O_{i,k+1}$ $\mathcal{R}_2 = O_{i+1,k} \; a \; O_{i,k}$ $\mathcal{R}_3 = O_{i+2,k} \; a \; O_{i+1,k}$ $\mathcal{R}_3' = O_{i+2,k} \; e \; O_{i,k+1}$ $P_{i+2,k} \wedge P_{i+1,k} \wedge \overline{P_{i,k}} \Longrightarrow \overline{P_{i+1,k+1}}$
5.	MOD 5 DARII	$\mathcal{R}_1 = O_{i+1,k} \; a \; O_{i,k}$ $\mathcal{R}_2 = O_{i-1,k} \; i \; O_{i+1,k}$ $\mathcal{R}_3 = O_{i-1,k} \; i \; O_{i,k}$ $P_{i+1,k} \wedge P_{i-1,k} \Longrightarrow P_{i,k}$
6.	MOD 6 FERIO	$R_1 = O_{i,k} \; e \; O_{i,k+1}$ $\mathcal{R}_2 = O_{i-1} \; i \; O_{i,k}$ $\mathcal{R}_3 = O_{i-1,k} \; a \; O_{i,k+1}$ $P_{i-1,k} \wedge P_{i,k} \longrightarrow \overline{P_{i,k}}$

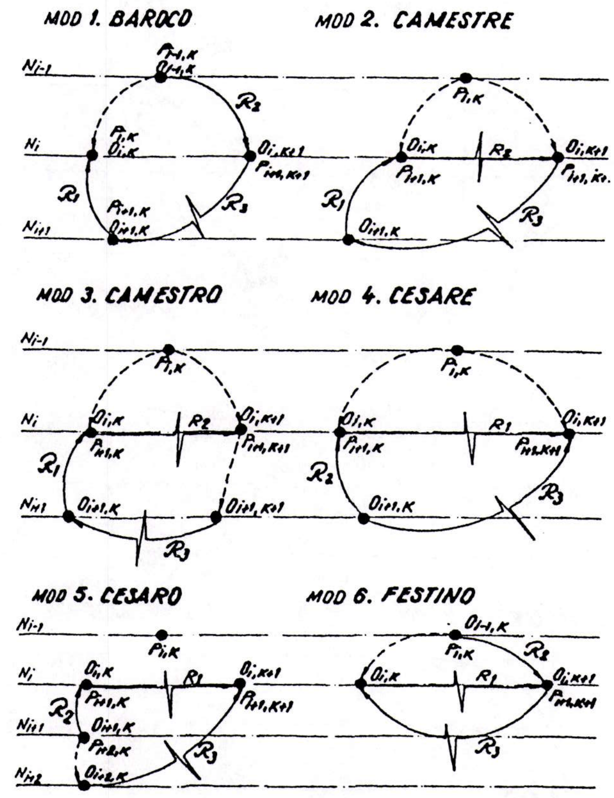


GRAPHS OF THE SYLLOGISTIC FIGURE No. 1.

SYLLOGISTIC FIGURE No. 2

TABLE 2

CRT NO.	SYLLOGISTIC MODES	RELATIONAL-OBJECTUAL PROPERTUAL INTERPRETATION
1.	MOD 1 BAROCO	$\mathcal{R}_1 = O_{i+1,k} \text{ a } O_{i,k}$ $\mathcal{R}_2 = O_{i-1,k} \text{ o } O_{i,k+1}$ $\mathcal{R}_3 = O_{i-1,k} \text{ o } O_{i+1,k}$ $P_{i-1,k} \wedge P_{i,k} \wedge P_{i+1,k} \longrightarrow \overline{P_{i+1,k+1}}$
2.	MOD 2 CAMESTRE	$\mathcal{R}_1 = O_{i+1,k} \text{ o } O_{i,k}$ $R_2 = O_{i,k+1} \text{ e } O_{i,k}$ $\mathcal{R}_3 = O_{i,k+1} \text{ e } O_{i+1,k}$ $P_{i,k} \wedge P_{i+1,k} \longrightarrow \overline{P_{i+1,k+1}}$
3.	MOD 3 CAMESTRO	$\mathcal{R}_1 = O_{i+1,k} \text{ o } O_{i,k}$ $R_2 = O_{i,k+1} \text{ e } O_{i,k}$ $\mathcal{R}_3 = O_{i,k} \text{ o } O_{i+1,k}$ $P_{i,k} \wedge P_{i+1,k} \longrightarrow \overline{P_{i+1,k+1}}$
4.	MOD 4 CESARE	$R_1 = O_{i,k+1} \text{ e } O_{i,k}$ $\mathcal{R}_2 = O_{i+1,k} \text{ o } O_{i,k}$ $\mathcal{R}_3 = O_{i+1,k} \text{ e } O_{i,k+1}$ $P_{i,k} \wedge P_{i+1,k} \longrightarrow \overline{P_{i,k+1}}$
5.	MOD 5 CESARO	$R_1 = O_{i,k+1} \text{ e } O_{i,k}$ $\mathcal{R}_2 = O_{i+1,k} \text{ o } O_{i,k}$ $\mathcal{R}_3 = O_{i+1,k} \text{ o } O_{i,k+1}$ $\mathcal{R}_3' = O_{i+2,k} \text{ e } O_{i,k+1}$ $P_{i,k} \wedge P_{i+1,k} \wedge P_{i+2,k} \longrightarrow \overline{P_{i+1,k+1}}$
6.	MOD 6 FESTINO	$R_1 = O_{i,k} \text{ e } O_{i,k+1}$ $\mathcal{R}_2 = O_{i-1,k} \text{ i } O_{i,k+1}$ $\mathcal{R}_3 = O_{i-1,k} \text{ o } O_{i,k}$ $P_{i-1,k} \wedge \overline{P_{i,k}} \longrightarrow P_{i,k}$

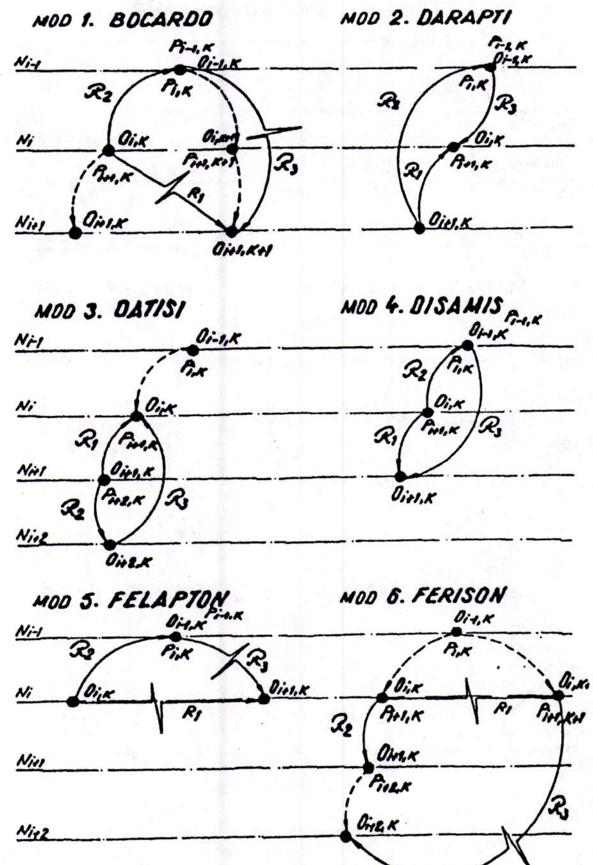


GRAPHS OF THE SYLLOGISTIC FIGURE No. 2.

SYLLOGISTIC FIGURE No.3

TABLE 3

CRT. NO.	SYLLOGISTIC MODES	RELATIONAL-OBJECTUAL PROPERTUAL INTERPRETATION
1.	MOD 1 BOCARDO	$\mathcal{R}_1 = O_{i,K} \textcircled{o} O_{i+1,K}$ $\mathcal{R}_2 = O_{i,K} \textcircled{a} O_{i-1,K}$ $\mathcal{R}_3 = O_{i-1,K} \textcircled{o} O_{i+1,K+1}$
		$P_{i-1,K} \wedge P_{i,K} \wedge P_{i+1,K} \longrightarrow P_{i+1,K+1}$
2.	MOD 2 DARAPTI	$\mathcal{R}_1 = O_{i+1,K} \textcircled{a} O_{i,K}$ $\mathcal{R}_2 = O_{i+1,K} \textcircled{a} O_{i-1,K}$ $\mathcal{R}_3 = O_{i-1,K} \textcircled{i} O_{i,K}$
		$P_{i-1,K} \wedge P_{i+1,K} \longrightarrow P_{i,K}$
3.	MOD 3 DATISI	$\mathcal{R}_1 = O_{i,K} \textcircled{a} O_{i-1,K}$ $\mathcal{R}_2 = O_{i,K} \textcircled{i} O_{i+2,K}$ $\mathcal{R}_3 = O_{i-1,K} \textcircled{i} O_{i+2,K}$
		$P_{i+1,K} \wedge P_{i+2,K} \longrightarrow P_{i,K}$
4.	MOD 4 DISAMIS	$\mathcal{R}_1 = O_{i,K} \textcircled{i} O_{i+1,K}$ $\mathcal{R}_2 = O_{i,K} \textcircled{a} O_{i-1,K}$ $\mathcal{R}_3 = O_{i-1,K} \textcircled{i} O_{i+1,K}$
		$P_{i,K} \wedge P_{i+1,K} \longrightarrow P_{i-1,K}$
5.	MOD 5 FELAPTON	$\mathcal{R}_1 = O_{i,K} \textcircled{e} O_{i+1,K}$ $\mathcal{R}_2 = O_{i,K} \textcircled{a} O_{i-1,K}$ $\mathcal{R}_3 = O_{i-1,K} \textcircled{a} O_{i+1,K}$
		$P_{i,K} \wedge P_{i-1,K} \longrightarrow \overline{P_{i,K}}$
6.	MOD 6 FERISON	$\mathcal{R}_1 = O_{i,K} \textcircled{e} O_{i,K+1}$ $\mathcal{R}_2 = O_{i,K} \textcircled{i} O_{i+1,K}$ $\mathcal{R}_3 = O_{i+1,K} \textcircled{a} O_{i,K+1}$ $\mathcal{R}_3' = O_{i+2,K} \textcircled{e} O_{i,K+1}$
		$P_{i,K} \wedge P_{i+1,K} \wedge P_{i+2,K} \longrightarrow \overline{P_{i+1,K+1}}$

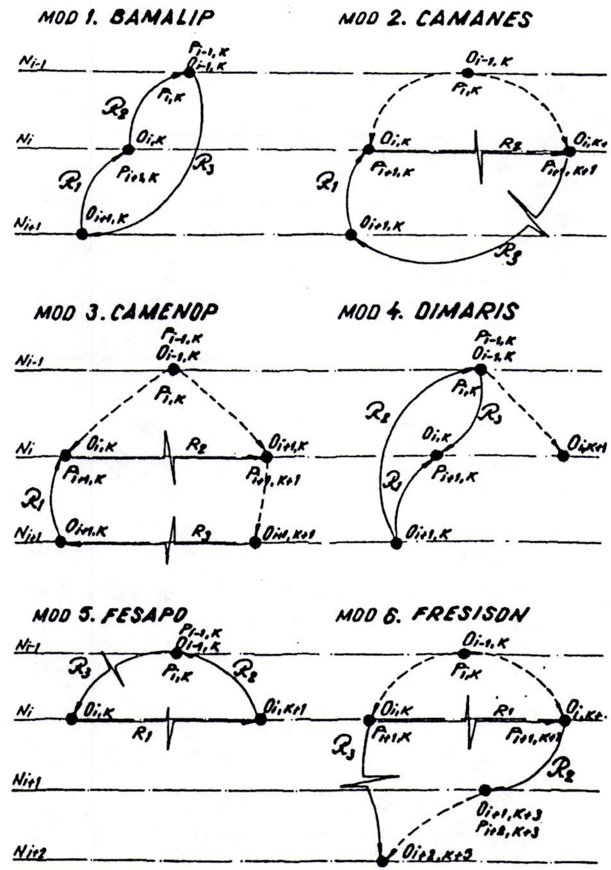


GRAPHS OF THE SYLLOGISTIC FIGURE No. 3.

SYLLOGISTIC FIGURE No. 4

TABLE 4

CRT. NO.	SYLLOGISTIC MODES	RELATIONAL-OBJECTUAL PROPERTUAL INTERPRETATION
1.	MOD 1 BAMALIP	$\mathcal{R}_1 = O_{i+1,K}$ a $O_{i,K}$ $\mathcal{R}_2 = O_{i,K}$ a $O_{i-1,K}$ $\mathcal{R}_3 = O_{i-1,K}$ i $O_{i+1,K}$ $P_{i+1,K} \wedge P_{i,K} \Longrightarrow P_{i-1,K}$
2.	MOD 2 CAMANES	$\mathcal{R}_1 = O_{i+1,K}$ a $O_{i,K}$ $R_2 = O_{i,K}$ e $O_{i,K+1}$ $\mathcal{R}_3 = O_{i,K}$ e $O_{i+1,K}$ $P_{i+1,K} \wedge P_{i,K} \Longrightarrow \overline{P_{i+1,K+1}}$
3.	MOD 3 CAMENOP	$\mathcal{R}_1 = O_{i+1,K}$ a $O_{i,K}$ $R_2 = O_{i,K}$ e $O_{,K+1}$ $\mathcal{R}_3 = O_{,K+1}$ o $O_{i+1,K}$ $\mathcal{R}_3' = O_{i+1,K+1}$ e $O_{i+1,K}$ $P_{i+1,K} \wedge P_{i,K} \Longrightarrow \overline{P_{i+1,K+1}}$
4.	MOD 4 DIMARIS	$\mathcal{R}_1 = O_{i,K}$ i $O_{i+1,K}$ $\mathcal{R}_2 = O_{i+1,K}$ a $O_{i-1,K}$ $\mathcal{R}_3 = O_{i-1,K}$ i $O_{i,K}$ $P_{i+1,K} \wedge P_{i,K} \Longrightarrow P_{i-1,K}$
5.	MOD 5 FESAPO	$R_1 = O_{i,K}$ e $O_{i,K+1}$ $\mathcal{R}_2 = O_{i,K+1}$ a $O_{i-1,K}$ $\mathcal{R}_3 = O_{i-1,K}$ o $O_{i,K}$ $\overline{P_{i,K}} \wedge P_{i-1,K} \Longrightarrow P_{i,K}$
6.	MOD 6 FRESISON	$R_1 = O_{i,K}$ e $O_{i,K+1}$ $\mathcal{R}_2 = O_{i,K+1}$ i $O_{i+1,K+3}$ $\mathcal{R}_3 = O_{i+2,K+3}$ e $O_{i,K}$ $P_{i,K} \wedge P_{i+1,K+1} \Longrightarrow \overline{P_{i+2,K}}$



GRAPHS OF THE SYLLOGISTIC FIGURE No. 4

synchronic objects to the same diachronic level ($R_{ik, ik-1}$);

4. The QUADRI DIMENSIONAL interpretation of each syllogistic mode implies by necessity the existence of a number of diachronic levels, properties, objects and relations (Tables 1, 2, 3 and 4 corresponding to the four Aristotelian syllogistic figures 1, 2, 3, 4).

E.g. the Barbara syllogistic mode implies three diachronic levels and the perpetual - objectual -relational interpretation:

$$\begin{array}{ll} R_1 = O_{i,k} \; @ \; O_{i-1,k} & R_3 = O_{i-1,k} \; @ \; O_{i-1,k} \\ R_2 = O_{i-1,k} \; @ \; O_{i,k} & P_{i-1,k} \cap P_{i,k} \Rightarrow P_{i-1,k} \end{array} \qquad (7)$$

- the BARBARI syllogistic mode implies 4 diachronic levels and propertual - objectual - relational interpretation:

$$\begin{array}{ll} R_1 = O_{ik} @ O_{i-1,k} & R_s^{\prime} = O_{i-2,k} @ O_{i-1,k} \\ R_2 = O_{i-1,k} @ O_{i,k} & P_{i-1,k} \cap P_{i,k} \cap P_{i-1,k} \Rightarrow P_{i-2,k} \\ R_3 = O_{i-1,k} @ \; O_{i-1,k} & \end{array} \qquad (8)$$

Conclusions

1. In elaborating a Universal Knowledge Basis it is necessary to associate notions and concepts with the objects (Q_{ik}) of the generalized syllogistic hyper graph.

2. The actual (P_{ik}), aprioric ($P_{i-1,k}$) and aposteriori ($P_{i-2,k}$) properties correspond to the objects on the diachronic levels; the properly ordered sets of properties, objects and relations constituted in syllogistic rows correspond to a route in the generalized syllogistic hyper graph.

3. The structure of the generalized semantic network of objects demands a hierarhical organization of objects (concepts, notions) by a generalized, taxonomic arborescent structure.

Concepts, notions and scientific assertions are currently presently in an entropic and redundant manner, making it difficult for the human brain to learn and understand them and at the same time impossible to implement them in Intelligent Systems, respectively in Artificial Intelligence.

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