4.4 Formalized thinking

Content

4. 4. 1 Formalism

I.M. Bochenski, *Philosophical methods in modern science*, Utr. /Antw., 1961, 51/52.

Preface. Combinatorics has been repeatedly assumed with Bochenski but not brought up. Therefore this. A collection of places, provided with a structure (logical explanation), and a collection of data to be placed ("depicted") are theme. Sometimes the collection of places, the configuration, is GG and the GV is the data to be placed; other times it is the other way around. A linen closet that is bought must be "filled in" by linen: the linen is the GG and the closet the GV because its structure must be such that all the linen can fit into it.

The graphic form. Operating with signs in a formalized way begins by considering the signs purely as graphic forms, as logically "blackened paper." Without thinking of the (semantic) content.

Arithmetic is formalized. But upon extension and adaptation of syntactic rules, any formalized language is arithmetic with signs ("symbols") that are combined in the logically rigorous framework of appropriate configurations with equal logical rigor.

Semiotic basis. (cf. 2.1.3) An anecdote. - "Jantje - asks the teacher to the son of a sheep breeder - if there are eleven sheep in the pasture and if six jump the fence, how many remain in the pasture?". - "None." "Why, eleven minus six is not zero, is it?" - "I really don't know that right now, but what I do know is that if six of the eleven jump over, the other five will follow."

1. Syntax. - "Faict ficta facit". - The West Flemish priest Van Haecke formulated this Latin phrase. Using the same letters as Faict, his superior, he formulated "a syntactically well-formed sentence" which translated means, "Faict commits imaginary things."

2. Semantics. - That syntactically well-formed sentence (each letter is in its proper place) refers to a reality, viz. the person and especially the method of the superior. If that person and his method of operation really actually exist as he formulates them, the sentence is "semantically meaningful," i.e. true, representation of reality.

3. Pragmatics. - The syntactically well-formed and semantically meaningful sentence aims at a result, namely, to enjoy oneself at the expense of the superior who, according to Van Haecke, pursues utopias.

Formalism. - Formalized language is limited to the syntactic aspect. It consists of terms that, free of semantic scope and of pragmatic purpose, are worked purely according to syntactic rules. To the tune of all arithmetic.

The difference between mere syntax regarding arithmetic - the master says: "eleven minus six is five" - and the semantics on the matter, i.e. once the eleven, the six, the five and the minus sign are filled in, - the boy says: "none" - is humorously clarified in the anecdote: universally - abstractly is "12-6=5" but concretely - individually regarding the sheep jumping over the fence is "11-6=0", for the reason of the herding spirit of animals.

Once again: with arithmetic or general mathematical signs, treated logically, blackened paper (as Bochenski says) does apply within formalized language but outside it, circumstances co-determine meaning in sometimes surprising ways.

Syntactic rule. We take a paradigm, namely multiplying 20 by 10. The last 0 of the result (200) has "its place" with the units; the penultimate 0 with the tens and the 2 with the hundreds. Each step in this multiplication algorithm (an algorithm is a diachronic configuration) requires the displacements just described. When multiplying, we do not think about it: we simply apply the "syntactic rule" (rule of operations). To multiply validly, we do not need to know why this rule exists : it is enough to know it.

Syntactic rule. Let us take a propositional example. Thus the equation "$ax^2 + bx + c = 0$" To "solve" such an equation, we start with the transfer of ‘c’ to the right but with opposite sign (instead of + -). This gives: "$ax^2 + bx = -c$". The syntactic rule here is: "Any member of one side of the equal sign may be transferred to the other side provided it receives an opposite sign." Even if one does not know the reason for the rule, if one applies it, counting with letters is valid.

Formalism. We just set forth the structure of arithmetic using two paradigms. Well, formalism does nothing but extend that structure beyond strict arithmetic.

Paradigm. GG "No man is a stone". GV. Convert to e.g. "No stone is a man". Symbol shortening. SeP (S = subject, subject; P is saying, predicate; e (from Latin nEgo, I deny) is general negation). Syntactic rule. The letters next to e may be interchanged (converted) in any formula of type XeY.

Bochenski notes that such operations ("operations") are arithmetic or calculus but not reasoning about the things that can correspond to them (that would have passed from the operative to the eidetic sense and would no longer be formalism).

4. 4. 2 Logistics is not logic

Bibl. st.: G. Jacoby, *Die Ansprüche der Logistiker auf die Logik und ihre*

Geschichtschreibung, Stuttgart, 1962, 48f. The triad "syntax / semantics / pragmatics" governs logisticians. And in that order. Whereupon Jacoby passes judgment. We let him speak with his own style.

"Logic practices business thinking, logistics symbolic and immediately linguistic thinking. In logic, business relations matter; it does not pay attention to language forms. In logistics, language forms prevail without paying attention to business relations unless in a secondary way." For R.Carnap (*Der logische Aufbau der Welt*, Berlin / Schachtensee, 1928) "language analysis" is the proper field of "logic of science" by which he means logistics. For him, intersymbolic (Note: symbols connecting) syntax stands above extrasymbolic (Note: outside symbols situated) semantics. What he calls "logical - he means logistic - analysis" of an expression, consists in giving this expression a place in a certain language system that must be established by stating its essential provisions. The "rules of logic" - he means logistic - turn out to be rules of language. They are at the same time ground rules in the construction of a sign

system. In formalized form, the connection between logic (logistics) and language would be particularly clear.

In a similar vein, W. Bröcker writes a logic (Logic): it pays attention to "the formal structure" of statements and would be the science concerning the "formal structure of all thought." The "logical" so conceived would be, without question, the structure of all that is thought.

B. von Juhos (*Die neue Logik als Voraussetzung der wissenschajtlichen Erkenntnis* (1953)) explained at the Congress of Philosophers in Bremen (1950) that logistics studies composition of language signs. These are considered "meaningful" if they are put together according to the logical-speech rules of language. Only then does the question of their object arise in the form of semantics (theory of the meaning of a sign). The logical calculus (arithmetic) limits itself to syntax (theory concerning the joining of signs). In this, as often elsewhere in modern mathematics - only linguistic thinking applies.

C. Lewis (*A Survey of Symbolic Logic,* Berkeley (Cal), 1914)) praises such a thing: "No one except a thoughtless man or one who has no experience concerning sciences can fail to recognize the enormous advantage of symbolic thought."

Symbolic speech and business speech - according to Jacoby - each has its own task. Symbolic speech is usable in the relationship between unchangeable symbols in the form of arithmetic ("calculus"). While business speech is usable in grasping changeable actions (data) through changeable formulas. Logistics can define its symbols completely arbitrarily and only calculate with them exactly. Business speech is about representable actions including adaptation to the reader or the listener. It has the wealth of its vocabulary and style. Symbolic - calculating speech is too poor for that.

Both modes of speech complement each other and neither replaces the other. Logicians and at present - 2005 - some logicians realize this. Even R Carnap. According to V. Kraft (Der WienerKreis, Wien, 1950), Carnap sees that formalization of logic and immediately logistics is "a secondary matter," that logic is based on meanings to begin with, and that syntax in itself alone is insufficient for the realization of logic.

When one does often learn that one or the other part of the logic ‘confirmed’ by logistics, then the answer is: logic does not need such ‘confirmations’! Logic ‘confirms’ itself. Where logistics corresponds to logic, there it is shown to be logically correct. Where logistics does not correspond to logic, there it is beside the point. Which often happens. Thus ever Jacoby.

4. 4. 3 G. Jacoby on logic and logistics

Bibl. st.: G. Jacoby, *Die Ansprüche der Logistiker auf die Logik und ihre Geschichtschreibung*, Stuttgart, 1962. At the Philosophers’ Congress in Bremen (1950), B. von Freytag, known for his Logik (*Ihr System und ihr Verhältnis zur Logistik*), 1955-1, 1961-3) clarified the difference between logic and logistics. Jacoby summarizes this in what follows.

I. Systematics.

1. Logistics is mathematics. Logic is philosophy. They differ from the point of view of foundations, problem statements, purpose, building method: logistics is professional science; logic is foundation of valid reasoning.

2. A profession is never definable by another: so far (1962) all attempts to define logistics as logic have failed.

3. Object of logistics are mathematical symbols and their connections both logical and non-logical. Object of logic is the philosophical fathoming of what is called "logical" while in logic symbols are only abbreviated terms.

4. Only the one logic exists. There do exist logistic calculi with as objects e.g. propositions (judgments), predicates, relations, modalities. Logically such calculi are based partly on second-class propositions partly on false propositions.

II. Historiography.

5. The history of logic is different from that of logistics.

6. The logistic historiography on logic pretends that part of ancient logic (the Aristotelian) and of medieval logic was actually already logistic.

7. The belief that logistics was "the ideal of all logic" is nowhere to be established. Logiticians understand the term "formal logic" as if it coincided with "formalized logistics." History shows that.

8. The main theses specific to the megaratic Philo of Megara (-380/-300), especially concerning propositional logistics, were adopted by today's logicians. In the wake of the Stoics, today's logisticians have adopted that type of propositional logistics together with the corresponding interpretation of the concept of implication. One can see that since Filo one 'calculates' with 'truth values' which we will now explain by means of the following combinatorics.

Note: In a philonic sense, a conditional sentence ('sun.èmmenon') is true in three cases.

PR = the preamble, Co = the conclusion, T : True, F = False

PrT / CoT: " If day, then light".

PrF / CoT: " If the earth flies (which is false), then it exists."

PrF / CoF: "If the earth flies (which is false), it has wings (again false)." A conditional sentence is false in one case:

PrT / CoF: "If the earth exists (which is true), then the earth flies (which is false)."

Note: it is the derivation (implication) that is called Filo true or false! Which in logic is nonsense: that is where a derivation is "valid"!

All attacks on Carl Prantl, *Geschichte der Logik im Abendlande*, 4 Bde, 1855/1870-1, Leipzig, 1927-2 (the basis of all research in this field), proved untenable. Many attacks of logicians on logic sprang from misconceptions of logicians themselves

In other words, there is a deep gap between logic and logistics that 'combines' derivations with knowledge content values, i.e., true and false. Whereas logic pays attention to the derivation, valid or not, from the knowledge content ('forma') of the preposition (as reason) of the knowledge content and of the postposition (as inference). And adheres to it whether the knowledge content is true or false.

4. 4. 4 If, then - relations (stoic)

Bibl. st.: G. Jacoby, *Die Ansprüche der Logistiker- auf die Logik und ihre Geschichtschreibung*, Stuttgart, 1962, 81f. Steller expands at length on the (truth) table of values in the Stoic sense. We take from this Jacoby's analysis.

1. If it is day, the sun shines. Prepositional phrase true; postpositional phrase true. Derivation valid. Logically valid not because Pr = true/ Co = true, but because day and sunlight are part-identical, i.e., no daylight without sunlight. Equation. If 2x2 = 4, then drank

Socrates the poison cup. Although Pr = true / Co = true, yet the derivation is invalid because 2x2 = 4 does not involve Socrates' drinking (there is no partial identity or analogy).

2. If earth flies, it exists. For the Stoa, the preposition was false but the postposition true. Derivation valid. Logically not because Pr = false / Co = true but because flying is not possible without existing (partial identity). Equation. If the earth flies, it has a core of nickel and iron. Although Pr = false / Co = true yet the flying of the earth does not involve that it has a nucleus of nickel and iron. No partial identity.

3. If the earth exists, it flies. For the Stoa at the time: Pr = true / Co = false.

Derivation invalid because, though existence is condition of flight, flight is not a condition of existence! Thus, no partial identity. Equation. If it is day, then it is night. Pr = true (because daytime established) / Co = false. Derivation invalid because day excludes night

(either, or). If both are established at night, then Pr = false /Co = true. Yet the derivation remains logically invalid.

4. If the earth flies, it has wings. For the Stoa at the time Pr = false / Co = false. Derivation valid. Logically not because of Pr = false / Co = false but because it was postulated that wings are condition of flight. Which implies partial identity. Comparison; If the earth consists of lead, then the earth has wings. Pr = false / Co = false. Yet the derivation is invalid because being made of lead is not a condition of having wings.

So much for stoic derivations and Jacoby's logical critique.

Logical derivations are from truth or falsity of sentences in themselves independent because truth values are a knowledge-theoretic matter, not a strictly logical one. Yet antiquity liked to connect if, then - connections with truth values (true / false). For rhetoric worked after in reasoning theory. For the Stoa (from the fourth century BC to the second century after him) rhetoric, persuasion, was "telling the truth." Incidentally, Aristotle, too, stood for such assertion: in his Analytica priora, he shows that for all figures of reasoning (syllogisms types) it is true that from true statements never false and from false sometimes true statements are inferable.

Enthymeme. An enthymeme is an argument in which a partial sentence is omitted.

Jacoby dwells on that. A = omitted prepositional phrase, B = if sentence / C = then sentence.

- A If day is part-identical with sunshine and B there is day now, C then the sun is shining.

- A If the flight of the earth foregrounds its existence and B the earth now flies, C then the earth exists.

- A If the existence of the earth is condition of its flying and B it exists now, C then it flies. A if day exists in conjunction with night and B it is now day, C then it is night....

- A If the flight of the earth involves wings and B the earth now flies, C then it has wings. Jacoby thus wants to show that part-identity in all models is presupposed in an unspoken way. All five models are logical given that they are enthymemes.

Philon the stoic was impressed by rhetoric with the ideal of telling truth yet true and false are in themselves only categorical judgments. By expressing them hypothetically, the derivations are exposed without regard to true or false. In doing so, the partial identity, i.e., that which makes if, then - sentences logical, is exposed.

4. 4. 5 A word about logistic linguistics

By way of introduction. As the inception of logistics goes through 1879, the year in which G. Frege (1848 /1925) publishes his *Begriffsschrift (Eine der arithmetischen nachgebildete Formelsprache des reinen Denkens*). For him, his logistics were the only true theory of thought. Today, however, there is an immeasurable number of mutually different, indeed contradictory, logics. Thus: for Frege the logical axiom "A statement and its negation cannot be true at the same time" still applied. Current "paraconsistent" and "dialectical" logics eliminate such a principle, which of course gives rise to profound philosophical problems.

Bibl. st.: Alfred Tarski, *Introduction à la logique*, Paris, 1971-3. Steller defines logics as "study concerning such terms as ‘and,’ ‘not,’ ‘or,’ ‘if,’ ‘then,’ and many others insofar as such terms are partly decisive in reasoning." Note: Please note that the terms ‘and’, ‘or’, ‘not’, ‘if’, ‘then’ do not have the same meaning as in natural logic. Logic creates its own language idiom. We would now like to make this clear briefly by means of an example.

The green lawn. Faced with a green lawn, the natural mind judges, "It’s nice and green." The logistic mind says, "It is green or blue" such that in that disjunction (‘or) at least one member is ‘true.’ Logistic mind speaks in terms of combinable possible judgments.

Material implication. Let it be said beforehand that in natural logic, implication ("if, then") expresses the objective connection (partial identity in this case) between a forma and another forma. And not as Tarski claims in virtue of some ‘psychological’ reason! That is the ‘formal’ implication.

Philonic implication. Tarski. The antecedent (type of preposition) is implied with the consequent

(kind of afterthought) connected by "material" implication such that it does not occur that the antecedent is true and the consequent false. Do we render. (T = true, F = false)

a. - If 2.2 = 4, then New York is a small city.-	T.F	= F.
b. - If 2.2 = 4, then New York is a large city.-	T.T.	= T.
c. - If 2.2 = 5, then New York is a large city.-	F.T	= T.
d. - If 2.2 = 5, then New York is a small city.-	F.F	= T.

For natural logic, there is no logical connection between prepositional phrases and postpositional phrases such that the derivation is invalid. That would be "formal" implication! For combining true sentences as understood by logistics, there is relation between truth values. This involves actual testability of the partial sentences (and thus involves epistemology). It is because, e.g., "2.2 = 4" is topically true and "2.2 = 5" is topically false that logistics relates to it. Because "New York is a small city" is topically true (if New York was brought up in its inception, when it was a hamlet, this would be logistically ‘topically’ true then but not ‘topically’ true now) and "New York is a big city" is topically false, both sentences qualify for a ‘material’ implication. This is a sampling of logistically true language.

One sees that regarding the implication table above, only the first material implication (by 0 indicated) is consistently false (ow) in her. The other three are "true" implications.

Chr. George, *Polymorphisme du raisonnement humain*, Paris, 1997, examines how actual thinking proceeds in concrete people - the common sense - but starting from the axioms of logistics. Not surprisingly, those tested "think wrongly" if one tests them - without first informing them about the linguistic axioms of logistics - not on the basis of natural logic but on the basis of such logistic combinatorial formulas. G. Jacoby is right: logistics calls itself "logic" but is actually "logistics.

4. 4. 6 The limits of Aristotelian' logic

Bibl. st.: Ph. Thiry, *Notions de logique*, Paris / Bruxelles, 1998-3, 116s. (*Limites de la logique d' Aristote*). In the context of "the old logic of predicates" (part: theory concerning mediate reasoning), the author devotes a few pages strongly reminiscent of a scholastic way of thinking, to predicates in logistic thinking. He then notes what follows.

Aristotelian logic retains its entire value today, even though its limits are a fact. Among the limits, three are brought out.

1. Aristotle's logic depends on the natural use of language. At once it is not totally "formal. After all, some rules of syllogisms presuppose an interpretation of the terms used. Note: Whether logic is incapable of such interpretation of used terms is not thereby proven.

2. It confines itself to the theory of syllogism, i.e. to a part of the "logic" (understand: logistics) of relations, namely the part which concerns "inclusion" (as a type of relation). Note: Reference is made to all that precedes, to make one understand how the proposer projects the term 'relation', proper to logistics, into the logic that integrates 'relation' as either a partial identity or an absurd identity from the outset.

3. It gets no further than the study of attributive statements, i.e. statements that are reducible to the language form "subject / copula / proverb." She thus excludes sentences such as "Pieter is taller than Jack" or "Liège lies between Brussels and Verviers."

Note: If there is a thesis that is radically refuted by all of the above, it is this third thesis of Thiry, which projects - again - logistics of relations into logic.

So much for criticism. And now to touting logistics as exceeding the "limits" of logic.

1. The vocabulary of natural language is replaced by symbols in such a way that confusions are avoided and endless expositions are simplified. Note: This is correct. But whether natural logic - within its domain - has no means of eliminating conceptual confusions is thus far from proven.

2. Precedence of the statement ('proposition') over the term: the logic (understand: logistics) of unanalyzed statements precedes the logic (understand: logistics) of predicates.

Consequently, modern "logic" follows more the trail of the nominalism of the Stoics than that of Aristotle's conceptualism. Note: That is correct. But this does not prove that nominalism

is not subject to criticism or that it is in all cases superior to conceptualism - term preferable to ‘conceptualism’. A more in-depth discussion would be in order here.

3. Modern "logic" replaces the concept of "truth" with the concept of "validity" or "coherence. It is not a kind of philosophy but a tool.

Note: All that precedes refutes the thesis that ‘truth’ is decisive for natural logic (it is not philonic logic) and heavily misses that ‘validity’ is central in virtue of identitive thinking. That logistics is a philosophy is evidenced by the fact that the proposer emphasizes that it rather harbors nominalism, - nominalism that ultimately involves genuine philosophical choice.

4. Logistics culminates in practical applications in the vast domain of computers, calculators and elaboration of artificial languages.

Note: That is correct. But whether natural logic plays no role at all, even in the vast domain of recent techniques, is not thereby proven. More so: even computer theorists admit that ‘computational’ thinking, peculiar to logistics and its creature-like applications - which no one can claim are not valuable - , is only one well-defined type of thinking and thus of logical proceeding. Which can nevertheless also be understood as ‘limit’.

Note: Time and again, logicians note that a lot of logicians project logics into natural logic and thus misunderstand the inherent nature of both theories of reasoning.

4. 4. 7. This Chapter Summary:

A set of places, provided with a structure, and a set of data to be placed are the subject of what is called combinatorics. Working with signs in a formalized way starts with combining them in a logical way in a purely syntactic way. Arithmetic exemplifies such a formalist language. The circumstances then determine the semantic and pragmatic meaning of the syntactic results. Formalism in language extends that mathematical structure beyond strict arithmetic. Thus, "No man is a stone" can be converted into "No stone is a man".

Logistics is not logic. The triad "syntax / semantics / pragmatics" governs logisticians. "Logic practices business thinking, logistics symbolic and immediately linguistic thinking. Logistics can define its symbols completely arbitrarily and with them only exact arithmetic.

Business speech is about representations and has the richness of its vocabulary and style. Both modes of speech complement each other and neither replaces the other.

Jacoby points out some differences in systematics and historiography regarding logic and logistics. In the philonic sense, it is about derivations being true or false. In logic, it is about the validity of derivations. Which shows the deep divide between logic and logistics. Jacoby discusses and critiques and number of stoic derivations. Logical derivations are of truth or falsity of sentences in themselves independent because truth values are a knowledge-theoretic matter, not a strictly logical one. Jacoby finally considers a number of enthymemes, a number of reasonings in which a partial sentence is omitted.

Frege believed that his logistics were the only true theory of thought. Today, however, there are an immeasurable number of mutually divergent, even contradictory logics. In addition, logistics creates its own axiomatics and idioms, whereby the common mind, not at all familiar with the idioms of logistics, gets stuck.

According to Ph. Thiry, Aristotelian logic retains its value even though he believes its limits are a fact. Not everyone agrees. He further believes that logistics exceeds the limits of logic. But even this view is subject to a great deal of criticism.