10.16. Elements of logistics
E.O. log 1.

Bookmark.

Note -- "E.O": means "elements of ontology" Ontology teaches as a result of everything questions how real it is and how it really is. What logistics is, we try to suggest in these few pages.

Note.-- The axiom par excellence of logics, especially in its development since G. Frege, is nominalism. Therefore, the transition from natural logic to logics was discussed at length. That transition illustrates the nominalist method. Applied to mere symbols, no problem. But applied to realities of life, problems arise which we have briefly pointed out in the last two pages.

EO LOG 2.

Elements of logistics.

Intent.

No superficial talk about logistics. Nor a hyper-specialized "system" on logistics. But solid information. - Because logistics is gradually becoming the form of thinking preferred by a growing proportion of intellectuals, especially those at home in the natural sciences and technology. A form of thinking which demonstrates both high quality and demands heavy reservation.

Therefore, for "uninitiated" ("les profanes," as a Christian George says in his psychology of natural thought).

Basic work.

We can truly pick no one better than *Alfred Tarski*, *Introduction à la logique*, Paris, 1971-3. After all, he is one of the prominent figures in logistics.

But before following his text as closely as possible, let us situate it in the evolution of logistics. Otherwise we will not understand the rather self-confident tone that his text exudes.

Preface.

Following D.Vernant, *Introduction à la philosophie de la logique*, (Introduction to the philosophy of logic,), Bruxelles 1986, J.P. Van Bendeghem, in a review - of it (in *The Owl of Minerva*) says what follows.

1. ***The birth date of modern 'formal'*** *(op.: formalized)* **logic** (*op.:* logistics). One usually puts this at 1879. Indeed *Gottlieb Frege* (1848/1925) then publishes his *Begriffsschrift* (*Eine der arithmetischen nachgebildete Formelsprache des reinen Denkens*), (Conceptual writing (a formulaic language of pure thinking modeled on the arithmetic one)), Halle. The use of precisely agreed symbols and the pursuit of the greatest possible clarity still belong today to the basic requirements of logistics.

2. ***Evolution.***

a. For Frege, his logistics were the only, true logic.

b. Today, however - says always Van Bendeghem - there exists an immeasurable multiplicity of mutually different, indeed contradictory, statistics.

Example.

Before Frege, the logical principle "a statement and its negation cannot be true at the same time" (contradiction principle) still applied. Today this linguistic rule of thumb is thrown overboard by the so-called paraconsistent and dialectical statistics.

Which, according to the proposer, gives rise to profound philosophical questions.

EO LOG 3.

The view of G. Jacoby.

G. Jacoby, Die Ansprüche der Logistiker auf die Logik and ihre Geschichtschreibung, (The claims of logisticians on logic and its historiography,), Stuttgart, 1962, 9, claims that Br. von Freytag clearly explained the thorough distinction between natural logic and logics at the Philosophers' Congress in Bremen (1950) for the logisticians gathered there from many countries.

Note.-- That is the reason why in this text we invariably use the term "logistic," (Gr.: logistiké technè, computational skill).

According to Jacoby who thoroughly researched the subject, logic differs from logistics in terms of foundations, questions, methods of construction and methods. Logic is one subject from philosophy, while logistics is a type of arithmetic (calculus) with symbols.

Object of logistics are mathematical connections ("combinatorics") between logical and non-logical symbols, characterized by I.M. Bochenski as "blackened spots on paper"; i.e. without semantic content ("empty shells").

Object of logic, if correctly understood (which is often not the case) are facts (data), insofar as they show identities (partial identities but also total identities), i.e. connections of similarity (metaphorical) or of coherence (metonymical), so that reasoning in the form of "if then" can be derived from them. Because that is 'logical': to make deductions (conclusions) from presuppositions on the basis of stated connections or relations.

A. Tarski's point of view.

O.c., 100.-- Having treated change bodies (functions), propositions (judgments), identity, classes, and relations in a logistic manner, he situates logistics with respect to "other sciences"

1. ***Usable.***

The ideal of a unified science dominates Tarski 's thinking.

Logistics is the basis of all other sciences for a reason. Because:

a. any discussion uses logistic concepts and

b. any correct reasoning proceeds according to the laws of logistics.

Note.-- One senses the self-assured tone Tarski demonstrates: his specialty is the foundation, not of some, but of all other sciences. Logistics is the lawgiver! She masters not some but all discussions and all correct reasoning.

EO LOG 4.

2.1. ***Not always used***

Literally, “This does not imply that an utter familiarity with logistics is a necessary condition for correct thinking. Even professional mathematicians-who do not generally commit false reasoning-do not know logistics in such a way that they are aware of all the logistic laws they apply.

Note. -- In other words: they do it without. But when one looks closely not with logistics and its ‘rules’ or ‘laws’, but with the all humans own natural logic, which they simply apply to mathematical objects.

2.2. ***Substantial practical importance.***

Nevertheless - Tarski always says - the knowledge of logistics is of considerable practical importance for those who want to think and reason correctly. Reason: it is helpful to the innate and acquired faculties in thinking and reasoning correctly and, in the particularly critical cases, it prevents the committing of thinking errors.

Note.-- Now suddenly he moderates the scope of logistics.

Position statements.

Before beginning the exposition, we mention a few statements of position. O.c. , x/xii.

1. ***Aristotelian logic.***

It is not brought up unless in two passages. Even more : the introduction does not contain a single element of Aristotle’s logic. Indeed, according to Tarski, this poor space corresponds rather to the limited role to which this type of thinking was reduced in what he called “modern science”. He believes that his opinion in this regard was shared by most logicians of his time.

Note.-- Because most logisticians a.k.a. unsuspectingly project their logistics into logic, they simply do not see what it is about and imagine that they can smugly reduce them to a minute part of their own logistics. This is also the reason why they believe that logistics actually,-and finally after centuries and centuries (the typical modern progress belief)-represents true logic.

As we shall see further on - and have already said by way of indication - : it begins with the notion of “identity” which in logistics is rather mathematically interpreted while in logic it is the notion par excellence (in its two variants, namely total identity and partial identity (analogy)).

EO LOG 5.

2. ***Methodology of the professional sciences.***

Tarski conceives of logistics primarily as an axiomatic-deductive science. Consequence: in his introduction, not a single problem is discussed that belongs in the logistics and method theory of experimental sciences. This is notwithstanding the large number of these types of sciences within the field of modern sciences.

The reason.

An experimental science is not only a system of propositions (assertions) ordered according to well-defined rules but also "human activities". Such activities - even where they are well thought-out - do not simply fit into the axiomatic-deductive train of thought of logics: they are, after all, "groping and failing".

Note. **-** With this Tarski frankly admits that logistics, with its axiomatic-deductive method derived from theoretical mathematics, has very clear limits as to applicability. That is, where people, living people, struggling with life and laboratory situations, think.

3. ***Logistics and mathematics***

Indeed, the main purpose of Tarski's introduction is to demonstrate what follows.

a. Logistic laws govern the entire system of mathematics in such a way that all mathematical concepts are singular or private applications of the obviously general logics.

b. The laws of logistics are always applied - consciously or unconsciously - in mathematical reasoning.

Above all, *Tarski* wants to show how in the construction of mathematical theories logistics is at work. He means mainly the axiomatic-deductive construction of all mathematics which, by the way, he briefly outlines o.c., 109/141 (*La méthode déductive*) and o.c., 143/209 (*Applications de la logique et de la méthodologie à la construction des théories mathématiques*), (Applications of logic and methodology to the construction of mathematical theories)

After all, in its beginnings, logics was an attempt to "foundation" (axiomatically-deductively-construct) mathematics. But over time it grew into "a coherent apparatus that is the basis - the common ground - for all forms of human knowing."

Note.-- Notwithstanding the limits conceded, Tarski maintains that logistics can "ground" all human knowing.

Again: the unified science and human knowledge!

EO LOG 6.

Functions.

Preliminary "definition".

Tarski (1902/1983) defines logics as the study concerning terms such as "not," "and," "or," "some," and many others insofar as such terms are a co-decisive condition in reasoning.

Note.-- Logic may agree with that to some extent.

"Linguistic turn.

Instead of being oriented towards reality, in ontological terms "being(de)", logistics is oriented first of all towards language and language use. This is what Anglo-Saxons call "linguistic turn" or "linguistic or linguistic perspective" (also called "linguisticism"). It is therefore not surprising when o.c., 49, Tarski says: "The propositional calculus (*op.:* theory concerning judgments or sentences) is without doubt the most fundamental part of logistics."

In other words: how to form sentences that although purely syntactic ("empty shells") nevertheless turn out to be fillable (semantically) in logistically valid ways?"

To illuminate that in its mathematical origins see here how Tarski begins his logistics.

Scientific theory.

Every scientific theory is a system (*note:* contradiction-free set) of propositions. These are called "laws" or still "assertory statements" or shorter "statements". This term means - in Kantian parlance - to pronounce on the truth or otherwise of an 'event' (a fact), preferably at the very moment of pronouncing. Short: factually true but not necessarily true.

Mathematical language.

Assertions occur in mathematics in a well-defined order, usually accompanied by a proof that substantiates a proposition (theorem).

Constants and variables.

Among the terms and symbols that appear in mathematical theorems and proofs, one distinguishes between "immutables" (constants) and "changeables" (variables).

Arithmetic models.

Here is how Tarski explains the two concepts. When one has understood this part well, one is well on the way to following the rest of the argument about propositions. For the propositional calculus follows the mathematical model or paragon.

EO LOG 7.

1. *Constants.*

A number, a zero (0), a (1), -- 'sum' (.+.) etc. have a well-defined meaning that remains itself the same - 'identical' - in the course of the mathematical account. Unchangeable. To questions such as "Does the zero (0) have a property?" or "Is the zero an integer?", a true or false answer is possible. For example, the zero is not an integer. The zero has properties. For example, "1 + 0 = 1".

In other words, 0 is the absence of addition or subtraction.

2. *Variables.*

Characters - 'symbols' - like a, b, c or x, y, z count as variables in arithmetic (number theory).

Consequence: to the question "Is x an integer?" there is no actual true or false answer, because as a variable, x is in fact, i.e. as soon as it would become a constant, either a positive or a negative number or zero.

Tarski: "One does not find such entities (*note:* mathematical operations) in our world because its existence would be contrary to the basic laws of thought."

Note.-- Tarski.-- Variables were used by mathematicians as early as ancient times and also by logicians, at least among the ancient Greeks. This in rare and special cases.

From François Viète (1540/1603) onwards, its use became methodical. At the end of XIX- the century - thanks to the introduction of the concept of quant(ificat)or - the value of variables is fully recognized. Largely due to Ch.S. Peirce (1839/1914).

Propositional functions.

With this, Tarski' sets up logistics formally. Mathematical expressions involving variables fall into two types namely propositional and descriptive (designative) functions. We dwell first on the former.

1. *"x is an integer"* does exhibit the verbal form ("empty shell") of a proposition (sentence, assertion, statement, judgment) but is not a proposition and thus can be neither affirmed nor refuted.

2. *"x is an integer*" can be made into a proposition thanks to filling in the empty shell by a constant (in mathematics, for example, a well-defined number).

Thus: "1 is an integer" is a true proposition.

But so : "1/2 is an integer" is an untrue sentence.

An expression that includes variables and becomes a proposition thanks to its interpretation is a propositional function.

EO LOG 8.

Terminology note.

Mathematicians use the term “function” in a different sense and thus reject the term “propositional function. Propositional functions and propositions that contain only mathematical symbols (without everyday words) - think “x + y = 5” - mathematicians call “formulas.

Immediately Tarski shortens “propositional function,” where this does not lead to misunderstanding, to “function.

“Empty shells”. Variables resemble the gaps to be filled in on forms.

Note -- In Platonic language - cfr Fr. Viète - they are called ‘lemmas’, i.e. summary and provisional names for unknowns. Thanks to Viète, they gave rise to the lemmatic-analytic method (short: ‘analysis’). Think of “analytic geometry”.

‘Satisfy’ When filling in identic variables by identic constants such that propositions arise, one says that those constants ‘satisfy’ the propositional function. Thus : $x < 3$. The numbers 1, 2, 2,5 satisfy while 3, 4, 4,5 do not satisfy the syntactic structure of the propositional function, by leading to untrue sentences.

Descriptive (designative) functions. This is the second type.

Expressions with variables which when filled in by constants become designations (designations), (descriptions), (descriptions) of things, are descriptive functions.-- For example: $2x + 1$.-- If x is replaced (filled in) by a constant number -- e.g., 2 -- then $2x + 1$ becomes the mathematical description of a number (thing). Thus: $2.2 + 1 = 5$.

Note.-- In algebra -- a part of number theory -- algebraic expressions and equations are applications (types) of descriptive functions.

Expressions. Variables, constants, symbols for the four basic arithmetic operations (+, -, x, :). Thus: x-y. Or still: (x+1) / (y+2). These are descriptive functions.

Comparisons.

Variables, constants, “=“. -- Thus: $x^2 + 6 = 5x$. In equations, variables are called ‘unknowns’ and constants that satisfy the equation are called ‘roots’. Thus, 2 and 3 are ‘roots’ in this case because $2^2 + 6 = 5x$. In equations, variables are called ‘unknowns’ and constants that satisfy the equation are called ‘roots’. Thus 2 and 3 are the ‘roots’ in this case because $2^2 + 6 = 5.2$ and $3^2 + 6 = 5.3$.-- Variables such as x or y in number theory play the role of ‘number descriptions’. In this, one says that the numbers are the ‘values’ (fill-ins) of the variables.

As an aside, in geometry variables describe points (things), lines, planes, figures that are the values of them.

EO LOG 9.

Excerpt: cognitive dissonance.

That one can employ ‘functions’ (propositional then) to describe ‘things’, in this case moral or conscience issues, is shown by what follows.

Bibl. sample: *Xav. Vanmechelen, Akrasia and self-deception* (*Irrationality in analytical anthropology*), in: *Philosophical Society* (*Communications*), Leuven, 45 (1999): 72v..

We paraphrase.

Rational behavior. ‘Rational’ here in the broad and somewhat ethical sense. According to Vanmechelen, usually in everyday language these rules apply.

1.1. Cognitive grounds normally determine (with exceptions) what a person believes to be true concerning the respective values of x’s and y’s.

1.2. Emotional (= axiological) and volitional grounds normally determine (with exceptions) what a person believes to be valuable in the matter.**--**

Note.**--** “Normal” means “unless circumstances dictate otherwise. Consider the rule, with exceptions. Well, 2. on cognitive and axiological (value learning) grounds, someone believes that x-and is better than y-and. So normally this one prefers to x-and.

Note **--** x and y are empty shells. They can, to some extent, be filled in, with actions. Thus: x = speak truth; y = lie.

Cognitive dissonance. ‘Dissonance’ is ‘contradiction’ or at least ‘opposition.’ **--** ‘Cognitive’ (with ‘axiological’ understood along with it) is “what rests on knowledge grounds”. Now, knowledge, in fact, rarely does not involve preferences or at least value judgments.

See here how Vanmechelen sees it. We rephrase.

Principles of action (axioms).

1. If a person believes that using x is more valuable than using y, then he will normally desire to x more than to y.

2. If someone prefers to use x to y, they will also want to x, **--** at least normally.

3. Despite his belief that his principles of action are true, he is free to use x or y.

4. He judges that it is better to use x now.

5. Yet he prefers to use y-. If these five are simultaneously true, then there is dissonance. Did not S. Paul say “I see the good but do the evil”? (Akarsia, unable to restrain oneself from, unable to control oneself). Or does not the psychiatrist say to the neurotic, “Thou art deluding thyself” (self-deception).

Note the difference: ordinary language says: “the good” (x’s) and “the evil” (y’s) or “something” (which is false) instead of employing the functional terms which of course sound more general.

EO LOG 10.

Quantification.

Apart from filling with constants, there is the quantification to get from propositional functions to propositions.

1. ***General propositions***. **--** "x + y = y + x". This is a propositional function with two variables, x and y. All possible objects (here: numbers) can satisfy these. The result is always a true proposition.

As an aside, the commutative law of aggregation is applied here.

Note.-- The most important mathematical propositions are stated this way : all general (universal) propositions - theorems - assert that all objects (e.g., numbers) of a well-defined category (type, class) exhibit that or that property.

2. ***Existential (private) propositions***. **--** Was it above 'all then it is now one type of "non-all" **--** "x > y+1". A propositional function. Not all paired objects (numbers) satisfy.

Thus: if x = 3 and y = 4 then 3 > 4+1. False. But if x = 4 and y = 2, then 4 > 2+1. True

In other words: for not all ('some' e.g.) objects (numbers) x and y it holds that x > y+1. Name: "existential proposition".

3. ***Singular propositions.*** **-** Not "all. Also not "non-all" But "just one". This is a type of "not-all".

If there is no variable and only individual objects (e.g., numbers) are stated, then there is a singular proposition. For example : "3 + 2 = 2 + 3". Just one number is described : 5.

4. ***Unthinkable propositions***. **--** Not "all. Also not "non-all" (some or just one). But "none. Thus: "x = x+1". Completion reveals that this proposition is unthinkable (nonsensical, absurd, incongruous, impossible).

Note.-- "For all objects (e.g., numbers) x and y, there exists a number z, such that x = y+z". Name: conditional existential proposition".

In other words: only if there are some numbers, then numbers exhibit a property. This type is a complication of the three previous ones (universal, here : existential, singular). If one wants : there is absolute existential (ad 3) and there is conditional existential.

Note.-- In natural logic, this is the "logical square," which consists of all/all not and of not all. Thus, some only is a model of "not all". Just as "right one" is.

EO LOG 11.

Quant(ificat)ors (operators).

Expressions such as “For all x, y it holds that ...” or “For some x, y it holds that ...” express either general (universal) or existential (private, singular) quantifiers.

Note.-- ‘Operator’ is used, besides in the sense of ‘quantifier’, also in other senses.

Tarski on natural language use. **--** In everyday speech, variables do not normally occur, and therefore quantifiers are uncommon. Yet “some” (“certains”) terms are not far removed from logistic quantifiers, such as “each, all, a certain, some.

To translate. **--** “All children grow up in stages” is logistically translated into “For all children (each child), she (it) grows up (grows up) in stages”. Or still : “For all x, if x is a child then x is a being growing up in stages”. -- Existential : “For some x, if x is a child, etc...”.

Appropriate symbols. **--** “For all objects x, y.... “ becomes “x,(A) y”. And “for some objects x y ...” becomes “x,(E) y”.

Returning to “For all or some objects x, y it holds that x = y+z, we translate symbolically in (I) either “x, (A) y” or “z(E)”. So the whole expression becomes; “x, (A) y z (E) (x = y+z): Which, of course, becomes mathematically-obvious.

From propositional function to proposition. **--** By introducing quantifiers, a propositional function becomes a proposition. But such that if not all variables are governed by quantifiers, the propositional function remains what it is : for reason of indeterminacy.

(I) Thus, “x = y + z,” thanks to the introduction “For all or some objects x, y, z holds that ...” becomes a proposition. But “There is an object z such that x = y + z ...” remains a propositional function (x and y are indeterminate).

(II) “z(E) (x = y + z)”. If x and y are filled in by constants (see above) or if x and y are determined by a ‘quantifier’, then it does become a proposition. Thus e.g. in the form of “For all objects x, y holds” (or more symbolically : “ x, (A) y”).

In doing so, one sees that the notion of function (an expression is function of variables) prevails but to be transformed into a proposition with truth values (true/false).

EO LOG 12.

Digression: logical quantification.

Beginning with Ch. Peirce's bean reasoning.

Deductive.-- All the beans from this bag are white. Well, these beans are from this bag. So these beans are white.

Inductively.-- These beans are from this bag. Well now, these beans are white. So all the beans from this bag are white. A generalizing reasoning.

Hypothetically.-- All the beans in this bag are white. Well, these beans are white. So these beans come from this bag. A globalized (or 'hole-ized' reasoning.

Peirce sees the difference regarding quantification.

Platon.

Already Platon clearly saw the two types of quantification. *E. Beth, De wijsbegeerte der wiskunde*, (The Philosophy of Mathematics), Antwerp/ Nijmegen, 1944, 36v. cites a text by *Platon* (*Filebos* 18b/d). There Platon first speaks of the letters of the alphabet as specimens of the collection (all) and then, clearly delineated, of the same letters as parts of the coherent whole that the alphabet is in his interpretation (whole). Or in current language: the alphabet as a system. To Beth, this duality was not even noticed.

Scholastic.

Ch. Lahr, Logique, Paris, 1933-27, 493 and 499, cites the distinction clearly and plainly.

There are distributive and collective notions (all people, the whole human being). There is a "totum logicum" (class, collection of specimens) and a "totum physicum" (system, coherent whole): specimens are similar to each other; parts of a system are, in fact, related to each other.

Thus, there is an induction that reasons from one or more copies to all copies (Peirce: induction) and there is an induction that reasons from one or more parts (subsystems) to the whole (system) (Peirce: hypothesis or abduction). We call the first type 'generalization' and the second 'whole-ization' (globalization). These are two types of quantification, somewhat related yet thoroughly different.

Tarski does not see that. And *K. Döhmann, Die sprachliche Darstellung de Quantifikatoren,* (The linguistic representation de quantifiers,), in: *A.Menne/ G. Frey, Hrsg., Logik and Sprache,* Bern/ Munich, 98, does claim that the distributive and the collective quantifiers (all/ whole) are accurately represented by the logistic conjunction, but this is not shown anywhere.

EO LOG 13.

Free (real) and bound (apparent) variables.

Two types of variables occur within a propositional function. We explain this with Tarski.

1. *Free (real) variables.*

As long as the variables are "free" or "real" variables, they make the function. If they are filled in by constants or introduced by quantifiers, then they are part of a proposition.

2. *Bound (spurious) variables*. -- Let us take the propositional function (II) z(E) (x = y+z). In it, x and y are free (real) variables, while z occurs twice as a bound (spurious) variable.-- But if we take (I)) x (A) y z (E) (x = y+z), then in it all the changeables are bound.

In other words: the structure determined by the presence or absence and location of quantifiers (and constants), decides the nature of the variables.

(III) "For all objects (numbers) x, if x = 0 or y =/ 0, then there is (OPM.: existentially) an object (number) z, such that x = y.z"

Behold a propositional function.-- We check the variables one by one.

- x is apparently a universal, quantum variable. First as quantor bound. Then twice as quantor-bound.

- z equals x.-- Although the initial quantifier of (III) does not contain z, nevertheless, from the existential quantifier ("is there") begins a part of (III) that is a propositional function introduced by the existential quantifier containing z, namely (IV) "There is an object z, such that x = y.z"

In other words, the two places where z occurs in (III) belong to the partial function (IV). As a bounded variable,

- y is in (III) with no quantifier containing y. Thus, y occurs in (III) as a twice free variable.

This is to clarify the role or function of operators on variables (and propositions or not).

As Tarski says as a logistician (and even just as a mathematician without logistics), how without formulas can an expression like "For all objects (numbers) x and y, it holds that $x^2 - y^2 = (x - y).(x^2 + xy + y^2)$" be clear? That is the power of modern mathematical-logical thinking.

EO LOG 14.

Proposition calculus (negate, con and disjunction).

Sometimes - says Tarski - this part is called "deduction theory." Just as every subject science has its constants (number theory has its singular numbers, classes of numbers, relations between numbers, operations on numbers, etc.), so logistics has its own constants, which, by the way, are common in natural language and in the sciences: not, none (negate), conjunction (and) and disjunction (or), encompassing ("if, then") etc..

Note -- They are also called "functors". -- Either they influence the proposition inside or they connect propositions. The analysis of them is called "propositional calculus.

Negation. -- This monadic functor, together with the affirmation, is the basic constant within the sentence.--

Where natural language usually says "The -1 is not a positive integer; there logistics says, "It is not the case that the -1 is a positive integer." Among the dyadic functors, we dwell on the following two.

Conjunction (logistic product).

Thus : "3 is a positive integer and 2 < 3". Such a thing consists of two (therefore : dyadic) conjunction members (two product factors).

Disjunction (logistic sum).

The term 'or' in ordinary language connects the two disjunctives (sum terms).-- But here problems arise with natural language.

Natural speech has two types of 'or'.

1. ***Non-exclusive*** (Lat.: vel), where at least one of the members or both can be true at the same time.

2. ***Exclusive*** (Lat.: aut), where either one member or the other can be true 'at the same time'. Not both at the same time. Consider: "A or non-A". Where in non-exclusive sense "A or B" is such that both can be true at the same time.

Logistic. -- Tarski.-- As in mathematics, logistic has only one meaning, the non-exclusive one. Thus a disjunction of two propositions, if both are true or if at least one is true, is considered (logistically) 'true'. Thus "every number is positive or less than 3" is (logistically) 'true', although there are numbers that are both positive and less than 3.

Note.-- Here one feels the artificiality of logistics compared to natural language.

EO LOG 15.

From logic to logistics.

Let's take a moment to consider this curious, yes, sometimes very bizarre transition. And this on the basis of Tarski's text itself. For he states that logic (natural thought), when using terms such as 'and', 'or' (and what we shall see shortly : 'if, then') relies on "some connection" between the members of the saying, whereas logics connects (via such functors) objects (numbers, propositions etc.) "without connection".

Precise by applications.

The lawn.

Standing in front of a normally exposed lawn, the natural mind says: "It's nice and green." As a representation of an experience, of course.-- The logistic "mind," however:

a. notes that same lawn,

b. strips it of its content (that it is beautiful green) makes it so to' an "empty shell" (the "beautiful green" becomes an "empty shell" fills it with - thus Tarski's example.

"It is green or blue to find in it at least one member of the disjunction that is 'true' (in the simply logical, natural sense), and to conclude that the whole saying is 'true' (in the logistic sense this time).

This while the natural logic:

a. that it is green, where finds and

b. that it is blue, superfluous nonsense (because non-perceivable finds. After all, there is only real connection between the lawn and the beautiful green color,--grass, however, not between that same lawn and the blue color.

"Tomorrow or the day after.

To a friend thou dost ask when he is leaving. Answer, "Tomorrow or the day after."

Natural logic will, if it turns out afterwards that the friend already knew clearly at that time, give the impression that e.g. lie was involved.

Such a thing strips the logistics of content, turns it into an empty shell, fills it in with its own "fill-ins," if need be without any connection.

"2.2 = 5 or New York is a big city".

For natural logic, the first member is pure nonsense and the second member is of course true (in a natural-logical sense), but the whole "... or ..." nonsense because one cannot see any real connection between "2.2 = 5" 'and' "New York is a big city".

One can see that already the use of the 'and' (conjunction as indicated by the logistic is logically questionable. For that 'and' pictures itself in the (logistic) 'or'.

EO LOG 16.

For logistics, “2.2 = 5 or New York is a big city” is semantically (substantively) meaningful and “true” (apparently in the logistic sense of “true”), in that, although the first member of the disjunction is pure nonsense, the second member is “materially verifiable” true (in the natural-logical sense). The pleonasm notwithstanding (“2.2 = 5” is too many), the logistic is satisfied with the ‘few’ (“New York is a big city”).

Again, “Tomorrow or the day after.

For the logistician, the terms become “empty shells” and fillable according to logistic axioms. Thus, if it turns out (= naturally-logically true) that either ‘tomorrow’ or ‘the day after tomorrow’, -- at least one of the two, is ‘true’, then the whole expression is logistically ‘true’.

Digression.

Chr. George, Polymorphisme du raisonnement humain, (Polymorphism of human reasoning,), Paris, 1997, 67 and 70, argues that - logistically - the quantor ‘some’, deprived of its natural-logical content, is filled in with “at least one and perhaps all”. One sees that the empty shell turns out to be fillable to the logically nonsensical, because - natural-logically - ‘some’ is certainly not ‘all’. However, ‘some’ is at least one and almost, in all but one case, all. But never ‘all’, as George argues. But that’s logistics.

Combinatorics.

Actually, the true name of logistics is ‘combinatorics’ of objects (numbers propositions e.g.).

Bibl. sample:

-- *C. Berge Principes de combinatoire*, (Principles of combinatory), Paris, 1968;

-- *J. Lagasse et al, Logique combinatoire*, (Combinatorial logic), Paris, 1976 (an informational work).

Briefly outlined: a set of ‘places’ (in logistics: empty shells) in which, according to axiomata, objects can be placed, study is combine study. Think of a closet in which a set of places can be ‘filled in’ with linen. Think of Noe’ s ark in which the animal pairs can be ‘filled in’. Whether there is any connection between them or not is of no unless very minor importance (though it is important for the axioms on the matter).

Logical.

Logic is perfectly acceptable as presupposing axioms and drawing consequences from them - as logistics does. But to the extent that that is confused with logic (well it is applied logic), that is ontological and only logistic, not logic.

EO LOG 17.

From formal to formalized implication.

The entailment or implication takes "if, then" as its linguistic form.

K. Döhmann, Die sprachliche Darstellung logischer Funktoren, (The linguistic representation of logical functors), in: *A. Menne/ G. Frey, Logik und Sprache*, Bern /Munich, 1974, 46ff., distinguishes, among other things, in natural-logical language what follows.

Excluding: if p, then q. Conditio quacum semper. p = sufficient (total) condition (no other condition required).	Includes: if p, then q. Conditio sine qua non. p = necessary (partial) condition.

1. ***Formal logic.***

Note.-- 'Formal' comes from the Latin 'forma', form of being, i.e. the essence (of something), i.e. what it is. This is captured in a corresponding concept in the minds of people e.g.. Aristotelian (natural) logic is concept logic in that it is logic of being. This is its ontological foundation.

Formal implication.

"If it rains, things get wet". The forma of "raining" and that of "getting wet" partially run together. This is called G. Jacoby "partial identity" (= analogy). Here it is coherence identity: rain causes (coherence "cause/effect)" wetness. It is a metonymic partial identity.

In other words, both formae partly run into each other and so one can be pronounced from the other. E.g. in an "if then" sentence.

O.c. 22, Tarski confesses that in natural language "if, then" is only pronounced "lorsque it y a quelque connexion," if there is some coherence (connection) between given realities.

'Logical'.

As *G. Jacoby, Die Ansprüche der Logistiker auf die Logik and ihre Geschichtschreibung*, (The claims of logisticians on logic and its historiography,), Stuttgart, 1962, 10 (and in many places elsewhere in the work), says, "logical," the core of natural logic, is "folgerecht," i.e., what in virtue of connection (similarity / coherence) one results from the other.

Well, logistics takes that term, strips it of its logical content, turns it into an empty shell and fills it in with its own product. The method of combinatorics that is logistics. So much so that e.g. Tarski confesses that the logical connection is "difficult to characterize." Of course: he doesn't even know that partial identity (distributive/ collective) is the essential core of 'logical'.

EO LOG 18

2. ***Logistics.***

First, we dwell on Tarski's psychologism in terms of natural logic.

O.c., 21.-- The logisticians who founded logistics wanted to simplify the meaning of the term 'or' and make it clearer and independent of "any psychological factor." To this end, they broadened the language regarding 'or' to include members on either side of it without a connection.

Note.-- The reader/readers will judge for themselves whether the logistic language is so much more 'clear'. And also: natural logic is much more and radically different from 'psychology'! It is a matter of (partial) identity e.g. a clear-cut concept.

O.c., 22.-- In addition to 'or', Tarski also asserts psychology on 'if, then'. "Ordinarily, we articulate and affirm an implication only when we do not know exactly whether yes or no the antecedent (preface) and the consequent (posthesis) are 'true'."

Note -- Whether this is a true reflection of the logical use of language is highly questionable. Logically, we use an "if, then" sentence when we go from a prephrase, in virtue of (partial) identity, to a postphrase. That psychology plays a direct role in this has not been proven anywhere.

Note.-- This recalls the narrow-minded statements of today's cognitivists regarding the "folk psychology" in which they so often situate natural logic

Note.-- There is a brief reference here to Chaim Perelman (1912/1984) the man of the "nouvelle rhétorique".

Did neo-rhetoric not strongly point out the artificiality and alienness of logistics and immediately the fact that natural logic has its 'akribeia', logico-legal accuracy, in the sense that within communication among people e.g. (or when they think about themselves) the whole situation, with its particulars (information), emphatically contributes to the accuracy concerning reasoning.

In court, for example, or elsewhere in daily life, people argue on psychological grounds among others but not only or even mainly on psychological grounds.

So much for what I consider to be a very painful gap in Tarski's understanding of natural logic. Would it not be the umpteenth time that a logistician projects his logistics into what he thinks he sees as 'logic' instead of studying logic from within?

EO LOG 18

Material implication.

"From the formal to the material implication". -- Romantic irony hovering superiorly over the given, in this case 'and', 'or' and now "if, then", characterizes the transformation we are now specifying.-- Logic takes the structure "if, then" already present in natural logic, hollows it out into an empty shell so that only the (otherwise hollow) name - in Latin nomen - remains. Then it fills it in with its product.

Conditional proposition. That is the product.-- As Tarski asserts, a (logical) connection is not necessary between what is "connected. See here how that goes.

Philon of Megara (IV- th century BC). Perhaps this thinker first introduced the material implication ('sunemmenon', conditional shell).

Note.-- Note again the dual meaning exhibited by the term "true," the logical and the logistic.

o.-- Antecedent true (T), (logical), consequent false (F), (logical).-- False derivation (in the logistic sense). –TFT.

a.-- Antecedent true, consistently true.- True conditional propostion.--
Philon: "If it is day, there is sunlight." -- TT.

b.-- Antecedent false, consequent true.-- True conditional sentence. -
Philon: : "If the earth flies, then it exists"-- FTT.

c.-- Antecedent, false, consistently false. - True conditional sentence.
Philon : "If the earth flies, it has wings." -- FTFT.

In Tarski's terms, "By the assertion that is the (material) implication, one states that it does not occur that the antecedent is true and the consequent is true." In all other cases (in the list above : a, b and c) the material implication is true.

Thus, the natural-logical implication (the formal one) is radically purged of "psychology" according to Tarski - and the material implication is "in every case broader" than the otherwise "not quite clear formal implication of logic" (o.c., 24).

In other words, any formal implication, if true and meaningful (makes sense), is a material implication (corresponds to it logistically). Not vice versa.

Behold the logistic revolution concerning "if, then". One sees that combining in this way becomes possible but logical reasoning is compromised.

EO LOG 20

Do we now dwell on Tarski's paragon.

In it, after all, the scope of Philon's revolution (as opposed to platonic-aristotelian logic) becomes clearer.

o.-- "If 2.2 = 4, then New York is a small city." -- TFT = FT.

a.-- "If 2.2 = 4, then New York is a large city" -- T.T = T.
b.-- "If 2.2 = 5, then New York is a big city." -- FT.T = T.
c.-- "If 2.2 = 5, then New York is a small city." -- FT.FT =T.

For natural logic, there is no logical connection between all the prepositions (antecedents) and the postpositions (consequences). For that same logic, the preposition in b and c is nonsense but the postposition is "true" (in the sense plausible to logic), but without logical validity.

Natural logic says of an "if, then" sentence that it is valid (or not or probably valid),--not that it is true unless in the sense of "justified" (or not or probably justified).

Logistics talks about truth values throughout. And within the empty but fillable shells. 'Truth' in two meanings: the epistemological (acceptable in natural logic) and the typically logistic (unknown in natural logic).

That's the difference between formal logic and logistics.

A physical law.

Tarski briefly develops the law "All metals are malleable." -- We give what he says in doing so.

Logistically, this is an implication with variables: "If x is a metal, then x is malleable". Or still: "For all x (holds), if x is metal (is), then x (is) ductile".

The truth of this universal law immediately includes the truth of all private (understand: private and singular) applications that one constructs by replacing ("filling in") x with the "names" of any materials (e.g., iron, clay, wood).

Never does it occur that the antecedent is true and the consequent false (ad o: W.OW = OW, above). More to the point: in all these implications, there is a close connection (*note:* which makes it plausible for natural logic) between antecedent and antecedent. This is shown, among other things, by the fact that the subjects coincide: "If x metal, then x pliable".

EO LOG 21

Tarski's note.-

He goes over the fill-ins one by one.

1. ***If x is completed by iron,***

then before and after are unsubtly true. Instead of expressing an implication, we replace it with a reasoning sentence, "Since iron is a metal, it is malleable."

Note.-- In traditional grammar, 'realis' was spoken of as a conditional sentence.

2. ***If x is filled in by clay,***

then we are faced with an implication of which the preposition is false and the postposition is true. Then, always in natural language, we are to replace the implication with "Although clay is not metal, clay is nevertheless pliable." This is an imputing sentence.

3. ***If we fill in x by wood,***

Then we create an implication in which and before and after are false. If, notwithstanding, we wish to preserve the conditional formulation, we must formulate 'contra. factual' (purely hypothetical) : "If wood were metal, it would be pliable".

Note.-- In traditional grammar, this is an 'irrealis' as a conditional sentence.

Again: material implication.

After these transformations from logistic to ordinary natural-logic language, Tarski explains -- Logistci take the natural formulations (of which they recognize the good right), empty them of content until an empty shell emerges which is called "logistic implication."-- Why? For reasons of form simplification (uniformity), clarification and de-psychologization (*note:* Tarski is partially mistaken here regarding psychology as indicated above).

Results.

Arises an "if p, then q" which remains 'meaningful' even though there is no connection between the conceptual content of p and of q. Only the factually ascertainable truth (in the two meanings, as mentioned above) of p. and q 'counts'. In other words: from 'formal' the implication becomes 'material'.

Nevertheless, there are logicians who wish to approximate the natural mode of speech. For example, *Cl. Lewis* (1883/1954), founder of modal logics in they *Survey of Symbolic Logic* (1918), who introduces the "strict implication". One reads his *La logique et ma méthode mathématique,* in: *Rev. d. Métaphysique et de Morale* 29 (1922): 4 (oct.), 455/474. Among other things, he seeks to account for deductive derivations ("derivable by necessity") in this way.

EO LOG 22

Implication within mathematics.

Logistic caveats.

There was once an ancient math for recent logistics. It functioned perfectly. Served several times as well as for philosophy (e.g., the Platonic) and for the experiential sciences and even for a certain rhetoric as The Philosophy of Mathematics thinking.-- Tarski, in the mindset of logisticians, believes he must formulate the following caveats.

Numerical theorems.

Tarski gives an example.-- "If x is a positive number, then 2x is a positive number". Tarski: the prephrase is called "hypothesis"; the postphrase "conclusion".

Tarski. - Mathematics also exhibits other formulations.

"From 'x is a positive number' flows '2x is a positive number'". "The hypothesis "x is a positive number" implies the conclusion "2x is a positive number". "The condition 'x is a positive number' is sufficient for '2x is a positive number'": Inverted: "The condition '2x is a positive number' is necessary for 'x is a positive number'". -- "For x to be a positive number, it is necessary for 2x to be a positive number ".

Note.-- One can add: "To "x is a positive number" is inherent that "2x is a positive number":

Tarski generalizes.

Instead of the conditional proposition, one might as well say, "The hypothesis implies the conclusion" or "The hypothesis is a sufficient condition for the conclusion. Or still: "The conclusion is a necessary condition for the hypothesis." -- Although some expressions are subject to logistical criticism, they are common in mathematics.

I.-- Problems.

We follow Tarski closely.-- Revs aim for terms like "hypothesis," "conclusion;" "derivation," "follows from," "implies!

The difference.

1.-- Within ordinary mathematical language, one talks about "numbers," "properties of numbers;" "operations on numbers" etc. In other words: about mathematical objects.

2.-- Logic speaks in terms of 'hypothesis', 'conclusion'; 'conditions', etc.. In other words: in terms of propositions or propositional functions insofar as they occur in mathematics. Tarski wants to introduce, instead of natural-logical terms (since always common) logistic ones.

Thus, Tarski defines equations and inequalities as a special type of propostional functions and polynomials or algebraic fractions as descriptive functions.

Ordinary math textbooks don’t look at that and ... Tarski acknowledges that “there is no danger involved.”

Note.-- And does not even mention that natural logic causes “there is no danger involved”. Yet he wants e.g. “$x^2 + ax + b = 0$ has at most two roots” converted into “There are at most two numbers x such that $x^2 + ax + b = 0$”.

II.-- *From natural logic to logistics.*

When we say, “From the antecedent (antecedent) follows the postphrase (consequent),” we assume in natural logic that the truth of the second proposition ‘ominously’ (“pour ainsi dire” (o.c., 28)) necessarily follows from the truth of the first;--yes, that we might infer from the first the second.

Again and again the logistic convention.---but the scope of the logistic implication does not depend on any connection (*note:* in natural logic: total, partial, or absent identity) between before and after.

If someone - says Tarski - (*note* : in his natural-logical thinking) is already annoyed by the expression “If 2.2 = 4, then New York is a big city; then he/she will be even more annoyed by another interpretation as e.g. “The hypothesis that 2.2 = 4, has as an inference that New York is a big city”.

Notes.

One cannot get rid of the impression that logicians like Tarski are coquetting with their paradoxical expressions instead of pointing out that it is not even about logic but about combinatorics.

The process.

‘Hypothesis’ or ‘inference’ are torn from their natural-logical context, robbed of their content, retaining the mere name (‘nomen’), transformed into an empty shell and filled in with a logistic product, the purely material implication: ‘On the hypothesis follows materially the inference.

But, once the logistic is confronted with e.g. the axiomatic-deductive sciences, it necessarily returns to the implication “which approaches the natural-logical much closer” as Tarski himself admits, o.c., 29 (cfr. Lewis’ strict implication).

EO LOG 24

Equivalence (equivalence).

T	F	F	This is a form of identity.
T	T	T	Equivalence exhibits (LS) a left side (LS) and a right side (RS).
F	T	F	
F	F	T	If LS true and RS false (F), and if LS false and RS true (T), then untrue equivalence.

If LS and RS true, then true equivalence. If LS and RS. false, then also true equivalence. So agreed!

Conversion of conditional proposition.

If LS is exchanged with RS (= conversion), then a converse equivalence arises.

True proposition.-- If x is a positive number, then 2x is a positive number.--
True converse.-- If 2x is a positive number, then x is a positive number.

When replacing 2x with x^2.
(I) True proposition.-- If x is a positive number, then x^2 is a positive number.
(II) False converse. -- If x^2 is a positive number, then x is a positive number.

If and only if.

This includes "both or none".

The two implications above (I) and (II) can thus be reduced to the same proportion.-- "x is a positive number if and only if 2x is a positive number". LS and RS can be exchanged without selling falsehoods.

In other words.

The same thing can be expressed differently.-- "From 'x is a positive number' follows '2x is a positive number'." And vice versa. In other words: the rules of conversion work.

Or "The conditions for x to be a positive number and 2x to be a positive number are mutually equivalent". Or "For x to be a positive number, it is necessary and sufficient (*note:* if and only if) that 2x be a positive number".

Define

Here the (total) identity is evident. -- 'If and only if' is often employed when introducing a definition (new expression).-- Stated: > (greater than) is already known (given). To enter < = (less than or equal to) one uses the known. "For all x and y it holds that x > = y if and only if not" "x > y" and "it is not the case that x > y" are thereby equivalent propositional functions. Thus: "3 + 2 < = 5" is equivalent to: "It is not the case that 3 + 2 > 5".

EO LOG 25

Laws of the propositional calculus.

1. ***Simplification Act.***

"If 1 is a positive number and 1 < 2, then 1 is a positive number." -- Clear proposition: only logistic constants (if, then) or mathematical ones (1, 2, <, positive number). Does not appear in math textbooks as a mathematical proposition, because mathematically not enriching. And its truth depends only or on the logistic constants (and, if - then) : "If today Sunday and sunshine then today Sunday" as other interpretation of the structure proves it.

Propositional variables.

To generalize.-- p, q, etc. do not necessarily refer to numbers, Sunday, the sun shines and so on but are the empty shell of a complete proposition.--

Ad (I). -- "1 is a positive number" = p. "1<2" = q. -- Propositional function: "If p and q, then p". However completed the formula gives only true sentences: "For all p and q, if p and q, then p". Note the quantifier "all". That is a first law of the propositional calculus: the simplification law.

Other model.

Thus "2.3 = 3.2" is a single case of the universal number mathematical theorem, which in its generality is a law, of "For all numbers x and y, x.y = y.x". This formula, too, may be filled in as one wishes : it is always true and therefore a law.

2. ***Other laws.***

By analogy, one can obtain other laws of the propositional calculus. In the articulation, the universal quantifier "For all holds that" - for reasons of obviousness - is omitted. .

Logistic identity law.-- "If p, then p".

Logistic simplification law on logistic sum.-- "If p, then p or q". Note: (1) was the simplification law on logistic multiplication.

Logistic Equivalence Law. -- "If p implies q and q implies p, then p if and only if q"

Logistic law on hypothetical syllogism.-- "If p, q implies and q implies r, then p implies r".

Because only change-likenesses occur in these formulas, they are universal. Thus they express a lawfulness of thought. This is the power of propositional combinatorics.

EO LOG 26

Truth functions and truth tables.

Symbols.

Not: -. And : ^ . Or: V. If, then : --> If and only if : <--> So : -p. p^q. p v q. p --> q. p <--> q. Variables and constants, parentheses allow all propositions to be penciled down in propositional calculus.-- So : "(p v q)--> (p ^ r). That is "If p or q, then p and r". Or the law of hypothetical syllogism ((p--> q) ^ (q--> r)) --> (p--> r).-- One sees the clarity of the method.

Truth functions.

Every propositional function within propositional calculus is a truth-function. In other words: the truth or untruth of the propositions created by filling in the variables is radically dependent on those filling in the propositions.

Thus: "(p v q)--- (p ^ r)". If one fills in that structure, one obtains an implication. The truth of the disjunctive antecedent depends only or on the truth of the filling propositions. The same for the conjunctive consequent.

Truth tables (truth matrices).

Initiator Ch. Peirce (1839/1914). It is used as a method of testing for truth.

1. ***Fundamental tables.***

-- p and -p, w and -w give p / -p with below w and - w and -w and w as the table for the function '-p' (the negate of p).

The other elementary functions and, or, if then, if and only if are shown below.

p q	p ^ q	p v q	p ---> q	p <--> q
t - f	f	t	f	f
t - t	t	t	t	t
f - t	f	t	t	f
f - f	f	f	t	t

Note.-- One remembers of course what was said above concerning the logistic meanings!

2. ***Derived tables.***

O.g. the fundamental tables, derivative tables can be established for compound propositional functions. We do not dwell on this here.

Note.-- The contradiction law: "- (P ^ -p)". Cf. "p v -g".

Two tautology laws (multiplication and sum): "p ^ p) > <--> p". Cf. "(p v p) <--> p". Tautological theorems in logistics assert nothing but what has already been stated in the presuppositions is implicitly present. Cf. Kant's "analytic" judgments. Thus, logics makes mechanical reasoning possible and, according to Tarski, it governs almost all reasoning in all sciences, relying either explicitly or mainly implicitly on the laws of the propositional calculus (o.c., 44).

Similarity. The logistics on similarity is "probably a part of the logistics that is of the highest importance." Other name for similarity: 'identity'.

Formulas. "x = y". -- "x is equal to y". Tarski also says, "x is the same as y" or "x is identical, with y".

Note -- It is immediately clear that the language of logistics concerning 'identity' differs thoroughly from that of logic. For the latter states first and foremost:

a. total identity of something with itself (total coincidence);

b. partial identity of something with something else (= analogy);

c. non-identity of something with something else. '

Similarity' is just one form - in addition to coherence - of partial identity. One keeps this difference well in mind.

Opposite.-- "x =/ y". -- "x does not equal y".

Laws.

The Law of Similarity of G. Leibniz (1646/1716).-- "x is equal to y if and only if x has every property of y and y has every property of x in common:-- In other words, it is about common properties of more than just one given. By the way Leibniz considered "x = y" as a definition of the equivalence symbol '='. Hence the equivalence formula. About which higher,

Derived Laws.

I. Reflexivity. "Every thing (object, symbol, proposition e.g.) is equal to itself". Formula: "x=x"

Note -- The total identity of logic is again **a.** taken, **b.** emptied of its proper sense, **c.** transformed into a mere name and empty shell and **d.** filled in with its own logistical product, namely resemblance (which logically is only partial identity). One sees it: something is imaginary split up into two 'entities' (of a purely logical nature), namely the thing and 'itself'. As if it were two entities existing in themselves. No: every thing insofar as it is totally identical with itself, is not divisible. That non-divisibility is precisely the total identity or coincidence with itself.

II. Symmetry. Mutuality.-- "If x = y, then y = x".

Note.-- Again, only similarity appears!

III. Transitivity.-- Transitive.-- "If x = y and y = z, then x = z". Or : "If x = z and y = z, then x = y.

EO LOG 28

Logical comments.

At least two interpretations are mentioned here

1. *Phenomenological.*

Faced with a given as given, phenomenology says, “What is so is so. All that changes or all that combines symbols is what it is . This makes sense of the total identity of something with itself, insofar as it shows itself as such.

2. *Discursive.*

H.J. Hampel, Variabilität und Disziplinierung des Denkens, Munich/Basel, 1967, harbors a rather scattered interpretation.

He indicates from an axiom, namely, “A is A” or “A will always be A.” He calls this “the univocality axiom concerning terms and their meaning. Within the same discourse, out-and-out, the meaning of a term does not change without explicit notice.

Note.-- This is a rapport-building tool. Nothing more. But the phenomenological interpretation of natural logic it is not.

As an aside, many commit this confusion because they are not (sufficiently) familiar with the ontological language.

Logical valuation of logistics.

Hampel sees in logistics the unambiguous requirement of logic clearly and unmistakably at work **-** “A = A” proves it just mentioned. For him logic is fixist: both thought and data existing outside thought do not change.

Formal logic.

Hampel forgets that “formal” white means “that which has as its object the forma, being, or mode of being. Now there are both changing formae, being-forms, and unchanging ones. Logically, this has no significance. Hampel is stuck in a pre-ontological logical language.

Hampel, then, thinks that logic can appreciate logistics only as a deviation from its form of thought. **-** No: logic fully accepts the introduction of axioms, **-** so e.g. that of logistics **-** and of deductive systems derivable from them. It sees these systems as axiomatically delimited subareas of applied logic. But certainly not as formal logic.

This is precisely why we have attached so much importance in the foregoing to the axiomatics of logistics: it **a.** takes what is, **b.** strips it of its content and thus turns it into a pure name (‘nomen’) in order to fill it in with its own products. Logically acceptable but not logic.

EO LOG 29

Class and relationship logistics.

Tarski ‘s handbook suddenly changes its point of view.

Classes.

In addition to isolated objects or events (e.g. numbers, facts of physics) which Tarski calls, for the sake of brevity, ‘individuals’, we now come to classes or collections of objects or events. Apart from the striking fact that the objects or events are strongly separated, they are nevertheless taken by the logistics as they are taken by natural thought. However, they are articulated in the straitjacket of propositional logistics.

Relationships.

In previous chapters, we logisticians learned about some types of relationships.

Note.-- Indicating that without the concept of “relationship” previous chapters are unformulaic.

Thus the relation ‘equality’ (between two objects, resp. events there is a similarity or the opposite difference : “x = y” and “x =/ y”). Likewise, relations between classes that partly coincide with each other (subset) or are completely apart. So that also the class theory does not appear to be unformable without the very fundamental concept of “relation”.

Except as a radical - logistic - distinction from the notion of property (class), ‘relation’ is taken as in natural logic. Admittedly also expressed in the propositional language of logics.

Corollary: For the naturally thinking person, both chapters are without much difficulty (if the axioms the logistication are observed).

Logic on relations.

To this day, one hears logicians claim that natural logic is unsuitable for accurately articulating and the very notion of “relation” and the judgment that articulates a relation and especially the reasoning that applies to relations.

It is clear from the outset that here again the projection of logicians plays a major role: they interpret logic as if it were logistics.

Consequence: confusion e.g. between ‘term’ and ‘word’ (in natural logic, a term can include many words).

This negative judgment of logicians is very surprising because the basis of the theory of classes in natural logic is precisely the relation! However, logicians do see that natural logic concerning classes is "an ultra-small but true part" of logistics (o.c., 70).

While in logistics the relation plays a basic role, in logic one sees, for example, not only relations between classes but first and foremost relations within classes. Class is logically defined as a relation.

Explanation.-- Class is unthinkable without the relation called resemblance (partial identity or (metaphorical) analogy): how can one see the specimens of a collection as specimens without seeing their resemblance to all other specimens? These are interconnected, brought to unity, by the common characteristic. Class is there only if there is relationship!

Note -- What Tarski forgets.

Apart from distributive notions (classes), since Platon, natural logic sees also and at the same time systems. Therein the parts, portions, subsystems - call them what you will - are interconnected into a single being brought about by coherence as a common characteristic.

The head, thorax, body, legs and wing of an insect do not resemble each other (unless by chance) but are related. That is their partial identity or (metonymic) analogy.

Note.-- With Platon "all and whole" in scholasticism "totum logicum vel physicum," now "class and system. Behold the two main relations of natural logic.

Note.--Exactly that is what one finds in

a. distributive and collective concepts,

b. corresponding judgments and corresponding reasoning.

Judgments.-- "This is a bird" (distributive). "This is the plume of a bird" (collective). The plume does not resemble the bird but is related to it (is a system with it). So are all judgments in logic.

Reasoning.-- One recalls the syllogisms of Peirce who clearly recognized the distributive nature of the collective type of reasoning (though he confused causal system with system without more).

This can be explained much better in an elaborated logic. We refer you to the first-year course "Logic".

Summary.-- Or “summering. - This amounts to “complete summarization”.

Bibl. sample : *Ch.Lahr, Logigue,* Paris, 1933-27, 591; 499; 567.--

1. *Inductive summering.*

Two type:.

a. *Distributive.*-- If one has known water to boil at 100° C. at least once (= summative induction), then one can hypothesize that all water will boil at 100° C. (= amplificative or knowledge-expanding induction). Generalization in the strict sense.

b. *Collective.*-- If one has explored at least one part of a school (= summative induction), then one gains a view (information) regarding the school as a whole or system (= amplificative induction).-- Generalization.

Note.-- This can also be done diachronically.-- A valid algorithm in the computer is an example (full listing).

R. Weverbergh, Postgraduate Integral Product Development, in: *Campus Newspaper* (Kul) 11 02 99, 12 states that such studies rehearse a mechanical product from inception to completion (full listing).

In passing, *O. Willmann, Abriss der Philosophie*, Wien, 1959-5, 409/433, called the genetic method (with Platon and Aristotle).

2. *Deductive summering.*

D.Nauta, Logic and Model, Bussum, 1970, 64v., gives an example (mathematical induction”).

The definition of all numbers greater than zero and integer.

0 is the first number. 0 + 1 = 1 is its successor. 1 is both integer and greater than 0. -- 1 + 1 = 2. 2 is integer and greater than 0.

The test of the definition with its two traits (integer and greater than 0) returns individually each time (recursive definition).

From all collectively (the definition) one reasons to each case individually. Which one tests by checking one by one.

One sees at once that summative induction does it in reverse : from a few samples individually with a common trait of knowledge one reasons to all collectively.-- This governs the whole of natural logic, which thinks in summary.

As an aside, one did not underestimate summative (also: Aristotelian) induction or deduction : it is the determined core of amplificative summering, which aims at determinable cases. In this sense, Aristotle hit the bull’s-eye with his summative induction. Even if some seem to underestimate that.

EO LOG 32

One logic but many logistics.

Why is there no separate logic of e.g. classes or relations? The reason is that it proceeds from a universal axiom, which is incidentally ontological (reality theoretic). The objects, resp. events, are first and foremost situated within the concept of 'reality' (in traditional language: 'being(s)'). Well, reality is governed by the idea of 'identity' (and its variants or absence).

Exemplify with an example.

1. *One's own total identity.*

Thus, like all possible realities, logistics has its own total identity or being(s) that it isolates through difference and gap from all that is not it.

As an aside, it is this identity that we are trying to make clear in this text (especially by emphasizing the distinction with respect to logic).

2.1. *Partial identities.*

Also called "analogies". -- Logic exhibits similarities and correlations with what it is not,-- For example, traditional logic (which it claims, e.g., to be able to subordinate as an unsightly subpart within its class logic). In this sense -- as a part -- there is metonymic or coherence analogy between logics and logic.

So e.g. mathematics. All that precedes is a long proof of how mathematical logistics is and how it is mathematical. Mathematics too - at least in an interpretation - is a part of logistics (again: coherence analogy).

2.2. *Non-identity.*

Not even a partial identity (at least at first glance).-- So e.g. - haphazardly chosen - with this apple here and now! Here neither resemblance nor coherence can be seen. This is the third identitive form: the absent identity, even the absent analogy.

Ontology.

Why is it that we can compare logistics with anything? So e.g. with this apple here and now? Because they are both 'something' (being, reality). This is non-nothing.

The comparative method, artery of natural logic (and ontology),--not to be confused with "equating everything with everything" (concordism), for to compare is not to equate,-- the comparative method stands or falls on identity (and its variants or absences).

This is the basic difference between logic and logistics.

EO LOG 33

Class logistics.

This began with G. Boole (1815/1864; strong algebraic). G. Cantor (1845/1918; *Mengenlehre*), (Set theory), elaborated.-- Some basic notions...

Individuals/classes (collections).

Objects, resp. events can be classified into classes of individuals (‘elements’ of sets). In number mathematics, classes of numbers are often discussed and in space mathematics (geometry) ‘places’ of points.

Order(s).

Classes of individuals are first-order classes. Classes of classes are second-order classes. And so on.

Formulas.

“The object x is an element (member) of the class K”. “The object x belongs to (s) the class K”. “The class K contains as an element or member the object x”. In short, “x E K”.

Application.

“If the set I is that of all integers, then 1, 2, 3, are elements of it”-- Formula: “1 E I”. “2 E I”. These are true propositions, while e.g. “1/2 E I” is an untrue proposition.

Classes and propositional functions with free variables. Mathematical

1.1. ***The propsitional function with free variable (I): “x > 0”,***

i.e., “The set of all numbers x such that x > 0”. Expresses the class of all positive numbers. As elements or individuals it has those numbers and only those numbers (// if and only if) that satisfy the function.

We call that collection “P. Then that function becomes equivalent to “x E P”. (‘E’ stands for: ‘belongs to’) Namely everything x belongs to P”.

1.2. ***This method is applicable to any other propositional function.***

Arithmetic. “x < 0” means “all negative numbers”. Or “x > 2 and x < 5” means “all numbers between 2 and 5”.

Space mathematics: The surface of a sphere, for example, can be described as “the class (collection) of all points in space that are at a well-defined distance from a given point (*note:* the center point of the sphere)”. As is often said in geometry: “The geometric location of all points in space at a well-defined distance from a given point”.

In other words, “place” is collection. Thus one can define space mathematical configurations (points, lines, planes, bodies) in propositional functions.

2. *Non-mathematical.*

"For any propositional function with one variable x, there is precisely one class C which contains as elements those objects (*note:* also non-mathematical) and only those objects which satisfy the given function." Or : "The class of all objects x, such that . Or still : "x E C". -- Generalized: "x E K", where C is a class belonging to the class K.

Rewrite.

(I) "The set of all numbers x such that ..."

(II) "The class of all objects x such that ..."

If C is the class to which x belongs, one can rewrite x (C) .

In such language, e.g. "1 belongs to the set of all numbers x such that x > 0" which follows: "1 E x (C) (x > 0)".

This expression is a proposition and a true one, because no free variable is in it (x is bounded). -- Well, she is the complicated saying for "1 > 0".

Quantification.

(I) and (II) show seemingly no quantifiers. And yet : like quantifiers, they bind variables.-- The quantification shows itself more clearly in the propositional function with -except x other variables. Thus: "The set of all numbers x such that x > y".

Such expressions do not denote a well-defined class, but, one fills in the free variables (not x which is bound) with appropriate constants - e.g. y with 0 - , then they turn out to be descriptive functions (formulas describing things like e.g. "2x+1" filled in with 2.3+1 describing 7).

Class as a property.

Leibniz's law contains the term 'property'. -- Many logicians argue that 'property' is replaceable by 'class'. That gives: "x = y, if and only if each class (property) that contains as objects either x or y as an element, also contains the other object as an element."

In other words: by many logicians, classes and properties are no longer distinguished.

***Note* --** The chapter further includes, among other things, the question of whether the class containing all possible objects exists (Russell's antinomy and his theory of types).

Also e.g. the notions of universal class and zero class, relations between classes, operations on classes, equipotent classes, finite and infinite classes etc. are discussed.

EO LOG 35

Relationship Logistics.

As for the classes, a brief suggestive sketch.

A. De Morgan (1806/1871) and Ch.Peirce (1839/194) put to the point what E Schroeder (1841/1902) finishes, a theory of relations.

Formula.

"The object x exhibits the relation R to the object y". "The object x does not exhibit the relation R to the object y". -- Briefly : "xRy " and "-(xRy)". .-- x denotes all objects exhibiting the relation R to y as "predecessors" and Y denotes all objects exhibiting the relation R to x as "successors".-- The class of all predecessors within the relation R is called "domain" and that of all successors within R is called "conversion domain" or "counterdomain" or "code domain".

Applications.

"x is father of y". -- Is an example.-- In the equality relation "x = y" ("x exhibits the equality relation with y"), each individual (object) is simultaneously predecessor and successor. So that domain and code domain are both the universal class in question.-- Something similar happens with "x =/ y" (the equality relation between x e y is false).

Note.-- "K C L" (K is enclosed by L) expresses a relationship between classes. Similarly, "KUL" or "K+L" express the relationship 'sum' of classes K and L.

Order(s).

First-order relations refer to individuals among themselves. The second-order relations refer to classes or relations of the first order.

Mixed relationships.

Occur frequently. Thus : the predecessors are individuals, the successors classes. Or : the predecessors are second - order classes and the successors first - order classes.-- Top model : "x E K" (x is member of class K), i.e. the relation "member / class".

Note.-- Numerical.-- The propositional function "x+y" can be expressed as "x+y = 0". Two free variables -- x and y -- are involved in a contradiction such that "x 0 y". Filled in e.g. with +3 and -3, it gives "+3 -3 = 0". Or : "x 0 y" or "x 0 y is equivalent to x+y=0".

Note.-- Tarski further dwells on the theory of relations (calculus: properties,-- reflexivity, symmetry, transitivity,-- one- or many-sidedness etc..

One can see it: Tarski 's introduction has a strong mathematical focus.

EO LOG 36

The paradox of the liar.

I.M. Bochenski, Philosophical Methods in Modern Science; Utr./ Antw., 1961, 72v., says: “Since Platon until the beginning of this century, this paradox has troubled all logicians.” - The text reads, “What I am saying now is false”.

1. ***Logistic.***

As a reduction to the incongruous, the response is : “If the liar says the truth, then he says falsehood. If he does not say them, then what he is saying is true”.

Bochenski.-- The statement says something about itself. Well, with mere syntax this is unsolvable. Only by means of meta-language is there a solution. For it is not an utterance at all and therefore “semantic nonsense”.

2. ***Logical.***

a. For the lying self inwardly, the statement makes semantic sense : he knows what he is saying now,-- perhaps out of humor or purely to speak eristically.

b. To the fellow man, however, two strangers show up.

2.1. ***The content of “what I am saying now”***

A sentence like “what I am saying now” says nothing! The “what” is an unknown. For one can just as well replace “what I am saying now” by a variable like “z is false”. Where z is fillable by all that concerning assertions the lying one labels as false.

In other words: the sentence has no content. Is therefore not testable. And is undecidable as to truth or falsehood.

2.2. ***The content of “is false”.***

If the intention - e.g. to lie or not to lie - in the sentence “is untrue” (its content) was known, then basically no problem.

But according to the folk psychological rule “The liar lies” there is suspicion but no certainty. Because unlike a natural law, the folk psychological law has exceptions (logistic: non-eventful reasoning). Therefore, “is false” applies as a second unknown: one can merely guess at the honesty at that, moment of the lying.

Final sum.

For the reason of the two unknowns, only a suspension of judgment is possible. “One does not know.” Behold - without a logistic theory - what one can assert with natural logic on the matter.

As an aside, “eristics” is the tendency to seek out the logi(sti)c weaknesses in the interlocutor.

To summarize. The content of “what I say now” is an unknown (for lack of content)) and the content of “is false” is also an unknown (intent unknown). The untestability - for now - of both propositions makes a judgment about them undecidable.

What precisely is reduced to the incongruous? On this subject *E.Beth, The Philosophy of Mathematics*, Antw./Nijmeg., 1944, 78/86 (Eristic), has it.

According to the proposer, the paradox would disprove the Platonic and Aristotelian definition of truth by applying the rule: “If ye, Platon and Aristotle, concerning truth-definition so assert then it follows that which ye refute.” That is “reductio ad absurdum”.

Aristotle, Metaph. thèta 10.
“He says the truth who believes that the separate is separate and the aggregate is aggregate, and the falsehood he who holds an opinion contrary to the things

Two aspects.
a. As Beth herself says: a confrontation of assertion (proposition) with reality (testability).

Note.-- The comparative method plays the decisive role here.

b. The ontological-logical identity axiom; “What (so) is, (so)”. shown in the expressions “the separated is separated” and “the joined is joined”.
All that is separated and all that is joined together are examples (applications) of what is called “the things” in the formulation.
It would thus be this view of truth and falsehood that leads via an implausible dilemmatic derivation to something absurd. In other words, it is not a valid definition.

What is the status of the dual requirement?
Has the liar lied in “what I say now” or not? Given that we do not know the content and cannot confront it with the reality of the intended by it (testing), this leads to judgment suspension. Given that we do not know the content of “is false” and cannot confront it with the reality of the lying person’s intent (testing impracticable), this leads to judgment suspension. Where exactly is the error in the definition proven? The only thing is that it cannot be applied for the reason of two unknowns. Not that it would be invalid!
Beth is full of praise for the logistisci on the subject. But logical analysis has its doubts about that praise.

EO LOG 38

"Social engineering" (j. Dewey).

John Dewey (1859/1952), "the foremost pedagogue of the XXth century" (Time), was a naturalist: materialist, determinist, and natural atheist. "There is no mind. There is no soul".

Instrumentalism.

All information (except his conceptions, of course), all behavioral ideals are not norms but instruments to modify (possibly adapt) the experience that is life.

In his *Human Nature and Conduct* (*An Introduction to Social Psychology*), New York, 1922, he advocates "social engineering; society modification.

Note.-- Parallel with K.Lewin (1890/1947) with his group dynamics and Human-Change movement (1956+), for whom norms were only conventions.

In other words: these senior American intellectuals want to change.

Here-and-now experience.

All authority, all tradition,--yes, all acquired knowledge must be laid aside to become modifiable in a mere here-and-now situation like a naked person who laid off all clothes. Modifiable

Note.-- This explains why Dewey chose B. Russell (1872/1970) when the latter had to give up his professorship in New York City in 1940 under the pressure of "a coalition for the safeguarding of public morality" in response to his "immoral" views.

Democratization.

Dewey wanted a society without distinctions regarding classes and the like, was leftist: he therefore chose Lev Trotzki (1871/1940), first a co-revolutionary with Lenin and Stalin, later ostracized and murdered as a "deviant" within the Soviet system.--Leftist democracy was the positive side in Dewey's thinking

Nominalism.

One sees it: the concrete human being with his input of ideas, values and ideals

a. is taken as deprived of any objective being (content) of its own (in all cases, deprivable),

b. thus made into empty shell and pure name (here-and-now experience) and filled in with Dewey's products. In which the method is called: "social engineering".

As an aside, for Dewey and contemporaries, the school is essentially the place where social engineering is the main task. It is an 'instrument' for democratization (in which education proper is second-rate (sciences, literature, history, geography))

Behold a nominalist cultural revolution.

EO LOG 39

"All that is, is manufacturable."

Bibl. sample :

-- *Roll. Van Zandt, The Metaphysical Foundations of American History*, The Hague, 1959 (vrl. o.c., 125/156 (*Realism versus Nominalism*));

-- *J. Largeault, Enquête sur le nominalisme*, (Investigation of nominalism,), Paris/Louvain, 1971.

As an aside, the pairing "nominalism/ realism" reverts to the pairing "constructivism/ essentialism." -- What is it about?

Modernity.

For modern man, insofar as typically modern and nominalistic, "all that is is manufacturable." We explain. And we do so by means of a "crass" example.

1. *Conceptual realism.*

Common sense, with its natural ontology (conception of all that is real) and, in that track, with its natural logic and use of language, holds that a child - suppose: a girl or a boy of eight years - possesses its own "being" (in Greek: eidos; in Latin: forma) which, through experience and reasoning, permeates our minds as the concept of a child, (here: of eight years).

The common sense ontology and logic does justice to that being, (that forma) with its content (i.e. the essence or essence). The basic attitude is thoroughly phenomenological, i.e., it lets the phenomenon, as it shows itself directly, be what it is in itself, objectively.

2. *Nominalist.*

The same child is taken out of the 'naive' order of things, the phenomena, - critically stripped of its content, i.e. the objective being or essence (forma), reduced to a mere name (Lat.: nomen), so that this empty shell is made fillable (the child is essentially malleable because without its own being content) with a content which may be alien to that child, a product of the autonomous modern, nominalistic I or subject.

This is the ontology that, in the Dutroux scandal some years ago, shook our people to their core.

One looks and turns it critically however one wants: that type of 'making' of the given reality with its inherent contents (formae) was at work in Dutroux and his associates. Is this not strikingly similar to what logistics does with all that is real and particularly logical?