8. Configuration Science

Content

8. 1 Combinatorics, configuration science.

S. Augustine of Tagaste (354/430), the greatest Church Father of the Western Church, is the first to write a separate order(s) doctrine "*De ordine*" (literally, About Order). He did this while preparing for Christian baptism. A multitude of data from musicology, geometry, astronomy, the teaching of number forms (all themes from the Pythagorean tradition), are brought up in Augustine's little work. Among others, with the basic concept of 'numerus' as a translation of the ancient Greek 'arithmos' which actually means "configuration of a number of units" (hence our translation 'number form'). The ancient Greek 'number' (at least that is how we say it) was at least 'two', i.e. ". - .". The three was a triangle, the four was e.g. quadrilateral etc.. In other words, a number consisted of a set of places fillable by the 'monas' (unit).

Combinatorics. S. Augustine thus gives a definition of "ordering": "Order is the placing of equal and unequal things in such a way that it assigns to each its proper place. This is how he puts it in his main work *De civitate Dei xix*: 13, thus mimicking Cicero imitates. In other words, GG is a set of places; GV is a set of things to be placed in such a way that each one is properly placed.

In 1666, the barely twenty-year-old G.W. Leibniz (1646/1716), one of the greatest thinkers of the 17th century, wrote the first treatise on what is now called "combinatorics," literally "combinatorics," "'De arte combinatoria" (On the skill of combining).

A mathematical treatment of combinatorics talks about permutations, variations, and combinations, among other things. For example, the letters a, b, c, and d can be combined in 24 different ways, starting with e.g. 'abcd', and ending with 'dcba'. These 4 letters are said to have 24 'permutations'. If we search all the ways in which groups of three different letters can be written with the same 4 letters, e.g. starting with 'abc' and ending with 'dcb', we again arrive at a total of 24. We now speak of "variations. Finally, if we look for groupings of these 4 letters, taken by three, but keeping the alphabetical order, we get only 'abc', 'abd', 'acd' and 'bcd'. In mathematics, this is called 'combinations'. Probability theory, among others, deals with all this, using many mathematical formulas.

C. Berge, *Principes de combinatoire*, Paris, 1968, defines "combining" as 1. placing data (GV) within a set of places, i.e., a "configuration" (GG), or 2. creating a set of places (GV) such that a number of things to be placed (GG) are situatable within it. For example, according to the Bible, Noë (Noah) just before the flood designed the ark (configuration), - GV- so that all the couples of living things - GG - could have their place in it. Thus, a woman arranges the linen to be stored - GV - in her closet as a configuration - GG - in an "orderly" manner.

Logic. No logic without the above combinatorics. The configuration e.g., of the judgment "S (subject, subject) - P (predicate, proverb)" tolerates that one fills in ("places") "The flower scented" but not "The scented flower," because as S. Augustine already said, "the appropriate place" (and not "just the place"). Notice the configuration of the complete reasoning: (R) here stands for "the rose.

S is P. ----- The scented flower ----- "The scented flower" is literally "misplaced.

(R) is S. ----- The rose is a flower. ----- "The flower is a rose" is 'misplaced'.

(R) is P. ----- The rose scents. ----- "The scented rose" is "misplaced.

Rule of three. This is a logically articulated mathematical configuration that can be "filled in correctly," for each filling or placement has its appropriate place.

If 100% equals 30 and 1% equals 30/100 (= 3/10), then 15% equals 15 x 3/10 (or 45/10). Woe to whoever "misplaces" the numbers in the above configuration. Similarly with what follows.

Bibl. St.: I.M. Bochenski, *Philosophical methods in modern science*, Utr./Antw., 1961, 52/54. - For simple, i.e. still comprehensible operations we can do without syntactic rules. "When it comes to somewhat complicated operations, we must confine ourselves to the syntactic rule". Understood: the syntactic rule is the visual.

Mathematical operations. - Do we dwell on the application of syntactic rules.

1. ***Editing. -***

27

x

35

―――

135

81

――

945

―――

DHTE

We write a multiplication as follows: The 1 of 81 belongs in the place of the T (tens) and therefore below the place of the tens of the number above it. - Bochenski: "When multiplying, we do not think about this. We very simply apply the syntactic rule: Every multiplication (and therefore every number line) must be placed one place further to the left." To proceed logically is to combine in the valid way in which the GG and the GV with correct 'places' has extant ... *continuously*. - Note: This causes the machine aspect of any practiced arithmetic to be defined in a syntactic rule. In other words, a machine calculated for this purpose does as well as observant man.

2. Stellar editing. - Bochenski's example. - GG - The mathematical equation $ax^2 + bx + c = 0$.- GV - To "solve" this equation. - We start by moving c to the right but adding the opposite sign. This gives: "$ax^2 + bx = -c$". - Bochenski: - "We act according to a syntactic rule that reads: 'Any member of one side of an equation may be transferred to the other side but should then be given an opposite sign'."

Combinatorics. - Someone once wrote that mathematical operations are applied combinatorics. Indeed both arithmetic and set operations consist in filling in the places of an appropriate (i.e. not the first best but a logically sound) configuration in the right way, i.e. logically sound. Who does not see that the configuration thus defined is an idea, i.e. an abstract - universal forma or structure which, as a collective lemma, awaits the fillings appropriate therein that represent the analysis that departs from the GG, via the collective lemma (lattice), culminates in the requested? If only one places the numbers and the letters and the signs correctly.

8. 2 Algorithm

We begin with a culinary model. Bibl. st. *Da Mathilde, 325 recettes de cuisine créole*, Paris, 1975, 215s. (Riz doux au lait de coco). The structure is twofold.

-1. Infrastructure. Cooking equipment. Fire. Ingredients: a well-ripened coconut, a handful of washed rice per person, a tablespoon of powdered sugar per person, a piece of cinnamon, a little nutmeg, juice of green lemon.

- 2. Suprastructure. This is the "algorithm. Strip the coconut of its bark. Pierce it with a nail that one beats into the head holes. Collect the fruit juice in a bowl. Break the nut with an axe. Peel off the fragments so that the brown outer skin is removed. Grate. Result a mush. Pour the mash into a bowl. Pour the bowl of fruit juice into it. Add a glass of water to it. Pour this rather liquid mash into a generous piece of gauze or tulle. Wring out over a receptacle. Result: a rather dry mash. Meanwhile: gently cook the rice on the stove until it is really cooked. Mix rice and coconut milk. Add sugar to it as well as nutmeg and cinnamon. Let settle. Enjoy. Da Mathilde (understand: Aunt Mathilde) ranks this among the desserts.

Algorithm. What Da Mathilde writes, is a total act consisting of a series of partial acts directed toward a goal. What is called "a dynamic system," i.e. a whole of which all parts are realized 'diachronically' (through time, one after the other). It gives a "praxeological" definition ("praxeology" is "theory concerning acts").

Configuration. - An algorithm is a diachronic type of configuration; all (and only all) of its portions (places) are completed one after another. It is so that one understands the Platonic pair "all / whole": each configuration is a whole (system) consisting of all its parts. Suppose that in the course of performance one skips one sub-act (too short) or needlessly repeats it (too much), one no longer has "all" and "whole"! In other words, summative induction is rooted in the dual meaning (all parts / the whole). An old proverb says: "Bonum ex integra et recta causa; malum e quocumque defectu" (Good is what is gaaf (whole) and correctly placed; evil is every defect in this regard). So in an algorithm.

Logical. The rule of three "If 100% equals 30 and 1% equals 30/100 (3/10), then 15% equals 15x3/I0 (45)" is one type of logically articulated mathematical algorithm. The parts - partial acts - do not tolerate omission (too short) or needless repetition (too much); otherwise the whole is not there with all and only all partial acts. The formula is a diachronic configuration, a set of places for correctly placed infills, one after the other.

A stave is such a tight configuration fillable by dancing notes one after the other. The week - with its sequence - is such a configuration of succeeding days. Formulatable in its own algorithms.

Thinking, reasoning, these are acts, total acts consisting of a well-ordered series of partial acts. Purposeful total acts. Logic is constantly committing algorithms, speaking in responsible sequences.

8. 3 Algorithms as programming.

Programming is converting the task into a logically correct sequence of elementary (= irreducible), for the type of computer understandable steps (phases of action). In other words: to form an algorithm. - Note: - Before deploying the computer, one sets oneself at the table with pen and paper: that too is already programming.

Algorithmics. - "Algorithmic thinking is the hard core of computer science." (H. Haers / H. Jans, *Computer science and computing in education*, in: Streven (Antwerp) 1984: July, 928/940). - One defines a sequence that expresses that which is at issue - the essence - in one after another.

Typology. - People talk in information circles about "structures" of algorithms. Thus e.g. the following three.

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a. ***Iterative algorithm.*** - The monotonous repetition of the same thing. - Model: "a,a,a,a,..."

The command (instruction, command) is simply repeated several times. Appl. Model. - One wants to extract a list of twenty names from a computer's stock (memory) of names: one presses: "input a name" twenty times.

- b. ***Sequential algorithm.*** - The non - single-tone sequence. Model: "a, b, c, d, etc."

Appl. Model. - Putting the coffee brewing into the computer. -

Initial situation: "I'm going to the coffee maker"

Pillow situations: -

(a). I'll take the coffee pot.

(b). Walk to the crane

(c). Fill the jug with water

(d). Etc. - Up to the final situation.

- c. ***Selective algorithm.*** A plurality of possible choices from which to choose.

Model. - "If the wanted, then 'yes.' If the opposite, then 'no.' -

Appl. Model: - There is someone in the ministry who has to calculate a pension via computer (= statement). The whole, just the whole of all the information that collectively make up the pension sum is what may come out at the end of the algorithm. - Thus: "Does entitled person belong to one of the following categories (worker, clerk, self-employed)? "Yes or no?" "If partial career then...".

Conclusion. - Algorithms, if strictly logically elaborated, define a lemma, i.e., a preliminary definition that become the final definition via the phases of the algorithm, where the phases of the algorithm (which is called Platonic) represent the analysis.

8.4 Something about neuronal networks.

Since 1960, - especially after 1985, computer scientists (U.S.A., Japan, Switzerland et al.) have been experimenting with a type of computer that contains neuron networks. The "classically" called computer contains a program, a neuron network not unless "in the making.

1. The human brain. - A neuron is a brain cell with its neurite and its dendrites. Our brain includes about a hundred billion nerve cells, which interact with each other thanks to astrocytes, among other things.

2. The neuron network. - This type of computer simulates (= mimics) our brain. - In the absence of the "classical" program, all that remains is a set of components - artificial neurons - which interact with each other ("connected") by means of electric currents.

Application.

- GG.- 1. A neural network, 2. a text.

- GV. (= instruction). - "Look up the word 'cookie' in the text."

Somewhat like a human, the neuronal network responds: the more a word resembles "cookie" (the wanted), the more the neuronal network gets "excited" (electrically, of course).

Summary. - The algorithms in the classical computer are transparent. The "algorithm" in a neuron network is, even for specialists, "eccentric" with its own selectivity. - Note: - For robots, neuron networks are a key phenomenon. Artificial 'looking' or 'word editing' is aided by neuron networks.

Man and Machine. - Bibl. St.: CEBOS, *Cerveau humain ("Maman, enco un miscui),* in Journal de Genève 10.12.90. - In the blink of an eye, a two-year-old child recognizes a cookie ("miseui" for "cookie") narrowly showing its edge from its packaging. In 1990, a classical computer did not succeed in doing so.

Note: The classical computer is not only spiritless, it is also lifeless. As a lifeless machine it lacks the, as it were, boundless capacity for adaptation and evolution that history and, among other things, the evolution (with its mutations) of all life forms (from a bacterium onward) show us. Let alone that the same computer would realize all the operations of the human mind. Is there analogy (partial identity) with the human mind, there is certainly no total identity.

8.4. This particle summarizes.

Ordering is of all times. Augustine was the first to put a comprehensive theory of order on paper. Centuries later, Leibniz approached to ordering through a mathematical theory of combination. In each case, it involves ordering data in a set of places provided for that purpose.

If we proceed logically, we validly combine GG and GV and give them their appropriate place. Complicated mathematical operations, algebraic equations and algorithms also require syntactic rules. Algorithms in neuron networks are much more complicated than the algorithms used in programming a classical computer.