4. Science

Content

4.1. The concept of science

4.1.1. Science

The term "science theory" dates from J.G. Fichte (1762/1814) who successively published *Grundlage der gesamten Wissenschaftslehre (*1794) and *Erste und Zweite Einleitung in die Wissenschaftslehre* (1797).

Today the term means "theory concerning the existence and essence of science, preferably with its explanation". Not without emphasis on the application of logic.

Definition.

Knowledge of a given ('object') in its actual existence (existence) as well as its mode of being (essence), - preferably also in its reason for existence or "cause" (sufficient reason as explanation) such that o.g. strict proof absolute certainty enforcing universal assent is attained, is scientific knowledge.- This has been the classical definition since Aristotle.

Aristotle.

Ch. Lahr, *Cours*, 534/547 (La science et les sciences), cites Aristotle: "We know something in an absolute way if we know of that something the reason for existence ('cause'), i.e., that by which/why it is necessarily there (existence) and is as it is (essence). Which is knowledge o.k.a. rigorous proof. Consequently, science is based on rigorous evidence".

This is of course an unachievable ideal in many cases but it remains - despite all modern and postmodern critiques - a norm.

Lahr.

Three essentials Lahr notes as a result of the above definition:

1. Applied logic,

2.1. Rigorous evidence,

2.2. Universal consent. Science as "the logic of a given".

One says "logic" but means - o.g. synecdoche (meaning affinity) - "applied logic."- One compares with expressions such as "The logic of our national politics" (the axioms that govern that politics) or "The logic of primitives" (the axioms that govern life and thought of primitive peoples and thus make them understandable).

Existence as the appropriate reason for existence.

An existence reason or explanation reason is "appropriate" insofar as it explains the given, all of the given and only all of the given.

So what follows. - To know that a physical body (e.g., I. Newton's apple (1642/1727)), if left to itself in our atmosphere, falls, is not complete scientific knowledge. Newton sought the reason for existence, namely, the general attraction of physical bodies. This attraction is a physical force.

Knowing that biological species evolve is still far from complete scientific understanding without knowing their reason for existence. Ch. Darwin (1809/1882) saw in "natural selection" the explanation. This reason for existence is partly physical (environmental changes e.g. but also partly "appropriated," i.e. biological (nutritional factors e.g.).

Also the driving force in that evolution, namely the struggle for survival, is a biological and thus an appropriate force, which is essentially different from e.g. Newton's attraction which is appropriate with regard to purely physical bodies.

To know that human phenomena exist as fact is to begin with human science. Only if, apart from physical and biological, specifically human reasons for existence to explain what is human are presented, is, according to W. Dilthey (1833/ 1911) - in his *Einleitung in die Geisteswissenschaften* (1883) - truly an appropriate explanation possible. Hence his 'verstehende' (comprehensively, 'understanding') method that seeks to grasp the human in man.

The reason axiom.

One sees it: the full stage of science is there only if one is guided by the axiom of (sufficient) reason or ground, the axiom par excellence that makes logic into logic and leads to full maturity in the applied logic that is science.

4.1.2. The entire Aristotle.

W. Klever, An epistemological error?, in: B. Delfgaauw et al, *Aristotle (His Significance for the World Today)*, Baarn, 1979,36/47, denounces the erroneous but widespread interpretation of Aristotle's conception of scientific work: 'one' reads him as if he had written only the *Analutika* ánd neglects what could refute such misrepresentation!

Topika.

In that writing, debate is central. Which makes it a 'dialectical' text.-One participant in the dialogue (note: a tradition derived from Plato) proposes, e.g., a certain definition. Whereupon a second participant tries to demonstrate its untenability with 'dialectical' arguments. 'Dialectical' is what Aristotle calls reasoning based on "ta endoxa." These are common opinions peculiar to either all or most or even the experts. They are the starting point of the discussion.

In other words: in contrast to the *Analutika*, about which a little more later, the non-apodictic - understand: the not conclusively proven - reasonings are central. These put a. experiential data (phenomena) first and b. go from there in search of the premises (the "causes" or explanatory grounds). "From that which is more known to us one reasons to that which is known without more" (*Fusika* l84 a1l).- Not surprisingly, mathematical, astronomical or medical forays come into play here.

Analutika.

The theory of syllogism (concluding speech consisting of two prepositional phrases from which a conclusion (nazin) is justifiable), of which Aristotle is apparently proud (i.e., he founded syllogism) forms the main content.

As an aside, an "apodeixis" (tribally related to "apodictic") in Aristotle's parlance is "to demonstrate something to someone" (*Topika* l65 a38), i.e., to strictly prove.

The *Analyticals* therefore deal with apodictic reasoning that is

a. not uncertainties (as in the *Topika*) but certainties prioritized and

b. Infer from it (strict logical deduction).

Aristotle's intention was thus to present "an educational proof" to an audience unfamiliar with the subject (students). To this end, the *Analutika* develop a formeellogical method suitable for setting forth knowledge already acquired. Whereas in the *Topika* it was about knowledge to be acquired.

Klever notes that the later Plato tutored the work of vorsion discussed in the *Topika*.

Which, by the way, Plato's lemmatic-analytical method (about which more extensively later) demonstrates.

Once again, Klever chalks up the one-sided reading of many who pretend that Aristotle wrote only the *Analutika* and never the *Topika*. Which makes him come across as a rigid reasoner and not as one who also did vortification work.

4.1.3. Science as applied logic.

Basic characteristic.

Science is knowledge acquisition thanks to the order "GG (given, available knowledge) "GV (requested) - OPL (solution)", governed by two axioms.

1. Scientists submit to the facts, because "contra facta non valent argumenta" (against facts there are no arguments), as the scholastics (800/1450) said. Those who affirm what shows itself apply the identity axiom: "What is, is" and "What is so, is so."

2. Scientists, however, do not simply submit to the facts, for that would reduce them to stupid coincidences: "The apple falls. It's there!" or "Biological species evolve. That's all there is to it!". The reason axiom says, "What (is so) is (so) because reasons exist for existence and being,-in the given or out of it or the two simultaneously."

Ontological language.

To establish (identity) and explain (reason) what is and so is, science speaks the three-part language of ontology.

1. Defining language.

Science aims at the identity of something with itself. This is expressed in (all kinds of) definitions.

2. Analogical language.

Analogy is part-identity of something with something else (= relationship). - Part-identity is fundamentally dichotomous: similarity or coherence. Science everywhere seeks similarity or relatedness - we explain briefly.

2.1. similarities.

Collection relies on similarity.- This leads to universal, private, singular judgments.

Special application: statistical judgments that express processes, which, if they meet other processes, occur privately (mean: percentage-wise, i.e. not 0% or not 100%).

2.2. Coherence.

System relies on coherence.- This leads to ald-part, multi-part, one-part judgments such as e.g., "For part of that mountain, it is true that . " or "For the whole culture, that .

Conditional sentences (expressing sufficient, necessary or sufficient-and-necessary conditions) formulate coherence.

Correlations include functional such as "Event B, if event A occurs, occurs." Or, "The role (function) of the director within the firm is ...".

Immediately there are functional laws: "For all physical bodies, if gravitation, then fall is law."

Consistency includes causation: "The agent A affects B in such a way that B actually exists."

Cohorts are possibly cybernetic: "Targeted processes, if deviated, are adjusted (feed back)."

Judgments that articulate coherence, articulate in their subject similarities along:

"All (some, just one) ... exhibit (show, exhibit) the following consistency ...".

3. Avoidance of contradictory language.

Science - unless it methodically eliminates the contradiction axiom (some logics do this) - shuns inconsistent judgments.

Corollary: "That A and non-A apply simultaneously from the same subject is impossible (nonsense)."

The numerous proofs "from the absurd (incongruous)" - in mathematical reasoning e.g. - show patently that science establishes contradictions, indeed, plays out as arguments by, by hypothesis, putting forward a (directly unprovable) judgment (model) together with a contradictory judgment (counter-model) which is provably incongruous, such that by a roundabout (indirect) way the first judgment (the model) is proved.

Conclusion.

The above shows that science is essentially applied natural logic.

In what follows, this will not be repeated again and again but it will be the supporting substructure of it. Above all, remember that the term "relation" stands for "partial identity of something with something else" in ontological language.

After all, the part-identical is thought "including" something else. If one thinks things "including" other things, then one encounters similarities and connections, - which do not show themselves if one limits oneself to' atomic' facts.

4.1.4. Theory of science (epistemology).

We tie in with J. Rennie, *Fifteen Answers to Creationist Nonsense*, in: Scientific American, New York, 2002, july 62/69.

The article opposes what is called "creationism" but defines some basic concepts - platitudes - regarding scientificity according to the NAS (National Academy of Sciences).

Fact. An observation insofar as repeatedly confirmed and, for all practical purposes, stated to be true is a "scientific fact."

Direct and indirect evidence.

The fact of evolution is directly visible in the fossils and the abundant remainder concerning organisms in evolution - although no one directly observed those transformations, the indirect evidence on the matter is compellingly clear.

For that matter, all other sciences rely on indirect evidence. Thus, physicists cannot observe subatomic particles directly but they test their actual existence by paying attention to the telling traces that such particles leave in suitable equipment. The absence of direct observations does not prevent physicists from being certain of their conclusion on the matter.

The limits of obviousness were emphasized by K. Popper (l902/1994; *Logik der Forschung*, Tübingen, 1924) who defined "science" as "sense of falsification (refutation)" to contrast science with psychanalysis and Marxism.

Rennie: "More recent thinking broadens that particularly narrow interpretation of the refutability axiom because too many branches of clear scientific understanding would be eliminated by it."

Law.

A "law" is called Rennie "the descriptive generalization" concerning natural phenomena.

Theory.

Facts, laws, reasoning, tested hypotheses concerning nature, insofar as explained in a seriously sound manner, constitute a scientific "theory. E.g., the theory of evolution, the atomic theory, the theory of relativity.

More than once people define the degree of certainty of a theory as "between a pure hypothesis and a law." This is to illuminate the component "construction" or "fiction" in a theory. It should be noted that no accumulation of affirmations per se of a theory transforms it into e.g. a law.

Meanwhile, when scientists talk about the theory of relativity, the atomic theory or the theory of evolution, they make no reservations about its truth.

Naturalism.

One L. Margolis et al. argued that evolution also proceeded outside of natural selection e.g.. To which Rennie: "But these forces must be natural. They cannot be attributed to the operations of mysterious creative intelligences whose existence is unproven in scientific terms."

Note: - This is a science-theoretic statement that is not unqualified, because

'Science' is axiomatically defined as exclusive with respect to all that is non-natural (understand: non-material). Such is a choice, not a proof. Even though a great many scientists agree. That non-natural intelligences e.g. cannot qualify in natural processes, is likewise unproven so far.