

# Methodological Analysis: Between Universal and Temporal and Spatial Limitation of the Validity of the Laws of Science

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**Abstract:** According to modern methodology, one of the fundamental necessary conditions that must be met by the candidates who are candidates for the title of science laws, sentences law-like, and therefore a condition actually fulfilled by the laws of science, is a condition of strict generality. One of the great methodologists of the twentieth century, Karl Raimund Popper, states that scientific theories are universal sentences and he specifies that the issue of whether the law of science they are universal in the strict sense, or only numerically, we will not resolve in any case by argumentation. It belongs to the issues that can only be resolved by agreement or convention.

**Key words:** law of sciences; Nancy Cartwright; Oskar Lange; Karl Raimund Popper; explanation; idealization **JEL codes:** B00, B40, C12, C18

## 1. The Laws of Science in Methodology

One needs to formulate — as clearly as possible — the meaning of the following categories: law, law of nature, law of science and determine the relationship among them. A controversy emerges right from the very beginning. It turns out that in the opinion of some researchers the very idea that the goal of science is to formulate which allows for explanation or prediction of occurrences, sounds trivial. However, acceptance of that statement involves numerous ontological, cognitive and methodological issues, which are not of a trivial character and are a subject of meticulous thought.

Other researchers, though, claim that the problem of the definition of law of science is not of primary significance in methodology. They advocate that intuitions of researchers about the law of science are different. Thus, it is difficult to formulate a satisfactory, even merely reporting, definition of that notion. It is explained that such state of affairs is a result of both a historical fact of variability of the demarcation line separating laws of science from the other statements formulated in science, and of the fact that in various sciences — also in this one — the statements of various categories and different functions are ascribed the role of law of science. Thus, it is concluded that all definitions of law of science are of historically limited meaning, which is relativised to the stage of development of science, and quite often to a given discipline.

The very idea of formulating the laws governing the economic phenomena might have been created via analogy to the significant cognitive progress noted in natural sciences in the present era. Mostly, this refers to the

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blossoming of the mathematical and physical research and to the nature of the causal link formulated in the field of mathematical and physical sciences. Indeed, this is the period when the law entered the cognitive tools kit of researchers. The influence of the methodology of the natural science is in particular clear when scrutinizing the physiocrats — the creators of the economic system.

The increase of the significance to the law of science and widening of the circle of disciplines in which such laws were formulated, determined the scientific dispute on determinism, i.e., dispute whether all phenomena (all fields of reality) are subject to law.

Not every statement in science deserves to be called law of science. That high cognitive status is ascribed only to strictly general statements, which fulfil certain further conditions, both formal as well as non-formal (pragmatic) in nature.

The law of science is such a statement, which needs to satisfactorily pass an experimental test, both theoretical and practical, which is basis for assuming that such statement is true.

It does not mean that such a statement is always true (absolutely true) in the strict sense of the word. It is fulfilled only in a certain abstract model, i.e., in the model in which it is assumed that no side factors interfere with the course of the process, and thus the suitable values equal zero. In fact, they interfere to a bigger or lesser extend. The basic laws of physics and other developed sciences, i.e., economics are of that abstract character. The economic laws are not endowed with the classic truthfulness (conformity with the objective reality), but with model truthfulness (conformity with a model).

I see the difference between the laws of science (laws) and regularities (laws of nature) in the fact that the laws of science are statements, and thus linguistic objects, and as such they belong to a language. Regularities, on the other hand, refer to a material world, i.e., objects and circumstances described by language. The differences pointed out are discussed in details by the representatives of the Lvov-Warsaw philosophical school, i.e., by Kazimierz Ajdukiewicz, Dina Szteinbarg (known in literature as Janina Kamińska, and then Kotarbińska) and Tadeusz Kotarbiński.

#### 2. Disputes about the Laws of Science

There is a certain dilemma and opposition as to the reach of laws of science due to various levels of reality, to put it in other words, due to various levels of structure of matter. The methodological efforts of sciences aim at detailed definition of conditions when laws of science are valid and this refers to economics as well. Such methodological efforts certify that that at least two opposing positions have been created. One of those advocates that the laws of science are of universal character, the other — right the opposite, that there is a time and space limit to the validity of laws of science.

As far as the first standpoint is concerned, it is claimed that the law of empirical science as a statement which is strictly general (universal) expresses some inner and necessary relationship between phenomena and is used for explaining and predicting phenomena. All laws are of strictly general character, whereas they are seen as statements with unlimited scope as far as time and place are concerned, i.e., they refer to all objects or phenomena of a given class mentioned in the statement regardless of where and when they occur. Law of that type of sciences as a synthetic statement describes always a certain real state of affairs (relationship) which exists in nature or society.

The other standpoint may be defined by the following observations: (1) first of all, it is claimed that the

requirement of strict universality is too strong to be used when determining class of occurrences or repeatable processes, (2) even if the requirement of unlimited universality is deemed to be a distinctive criterion one would have to admit then that almost all statements of social sciences and humanities are pseudo laws; their validity is usually explicitly or implicitly limited to some historic periods, and if they do not contain such limitation, they usually prove to be false, (3) it is assumed that it is where — according to the first standpoint — the conviction about the unlimited universality of law of science comes from; the first and principal source is the conviction that the course of events is not dependent on the very characteristics of time and space as such, because time and space are uniform continua, i.e., no area of space as such and no moment in time as such is distinctive in any aspect, (4) the motives which might have induced one to focus on the discussed requirement are uncovered, despite the apparent difficulties; that behind the presented concept of strict generality of laws of science there was a conviction that individual laws should derive from one global law; if there existed a discipline able to formulate such law it would have had to be expressed in strictly universal terms; all statements referring to individual aspects of fragments of global structure of the world would be special instances of such law. Looking in retrospect on the development of scientific thought, one may state that the idea of such basic discipline has accompanied the development of contemporary science. The Newton's mechanics, quantum theory — these are the examples of theoretical concepts that were thought to be able to disclose basic nomological structure of the world.

The dispute is thus about whether the requirement of unlimited universality of laws means that the scope of validity of law may not be limited to some spacial area or time interval or whether it is just the opposite. It seems that the understanding of laws of science, according to the first and second standpoint, refers to two different levels of organization of matter. For this purpose one needs to wonder, if the laws of first type really describe the state of affairs in nature and in society or only in nature. The very reason for which the laws of science require unlimited universality is in fact significant and is of methodological character.

The discussed dispute is strictly connected with the naturalist dispute in its both planes: ontological and methodological. The assumption that only the laws of natural sciences are of universal character (strictly general) leads to negating the naturalism standpoint in its both planes: ontological and methodological. One may, on the other hand, combine it with anti-naturalism in its both planes.

### 3. Laws of Science in Various Directions/Trends of Economics

In view of the above explanations of the previously outlined standpoints, avoiding their sources and motivating differences as more or less convincing, what is left for scrutinizing is the state of affairs only in social sciences.

The research practice deals with the situation by liberalizing methodological requirements, i.e., it renounces the requirement of strict generality and introduces the statement with limitation of validity to a certain area in space or time interval. Statements with such limitations are called historical generalizations. Undoubtedly, social sciences are able to formulate such generalizations. In view of lack of strictly universal statements, in those sciences it is the historical generalizations that serve as basis for explanation and predicting. More detailed analysis indicates, however, that the differentiation of real laws from regular generalizations on the basis of unlimited universality is not satisfactory yet. The very notion of historical generalization as an opposition to law of science seems to be rather unfortunate. The applied liberalization of methodological requirements that need to be fulfilled by statements suitable for general premises of explanation and prediction results in certain

consequences. It turns out that the representatives of economic sciences while indicating various laws remain between logic and research practice. In fact, they operate historical generalization though they talk about discovering laws in science.

The scope of applicability of laws included in the theory of economics is varied. It depends on the range of conditions which are the source of their operations.

The widest scope of applicability can be found in economic law created in the production process, i.e., the technical and balance laws of production. They occur in the stages of society development when the society as such has already been formed and in which the production is of at least simple re-production character.

The range of validity in case of laws of human behaviour and laws of coincidence is quite different. They are created by economic relations and they change accordingly. Lange distinguishes three types of such laws of diminishing range. (1) Laws of economy while depending on the production relationship are determined by the features existing in more than one social formation. They express the characteristics which are common to economic basis of several social formations. Their activity spans all social formations whose economic basis has those common features. These are the common laws of economics of several social formations, such as the laws of value, supply and demand. When the exchange involves money, various law of monetary circulation are at work. (2) The laws whose operation is limited to a certain historical social formation or even to a certain stage of development of such formation. These are specific laws of economy of a given social formation which result exclusively from relations of production means which shapes the whole production relationship forming the economic basis of a given social formation. (3) The laws of economy resulting from the influence of the superstructure on economic relation in a given social formation. This refers to a smaller or bigger economic role of a state, e.g., as regards the creation of paper money, credit money, etc.

At each stage of social development (social formation) there is thus stratification of the laws of economics operating there; the laws are of various range and various connection to the economic basis and to the superstructure of politics and law.

One needs to point out here one more problem concerning the reference to the issue of the range of laws of science of various directions of economic thinking.

Both old and modern trends in economics seem not to notice the interdependence of laws of economy and the variable historical conditions. The remaining trends of contemporary economics can be divided into various versions of two main trends: subjectivism and historicism. Both trends developed from taking a position towards classical economics.

Further we discuss the trends — subjectivism and historicism indicating how the essence of the law of science in the theory of economics was perceived within each of them. First of all however, one needs to explain that the subjectivism trend derives indirectly from the classical economics. The link connecting the classical economics with the subjective economics was vulgar economics.

The subject of vulgar economics was the exchange relations and the market phenomena and processes resulting from such relations. It scrutinized relations between the buyers and the sellers with the focus on the purchased and sold goods in the background. It left out the relations of production which constituted the principal interest of classical economics. The consequent preference — instead of objective social relationships — of the issue of subjective attitude of human being to the items used to satisfy needs led to the creation of subjective approach in economics. Instead of discovering the laws of economy operating in objective reality the subjective

approach searched for and formed praxeological principles of behaviour (e.g., the principle of economy) ascribing universal power to them.

The conviction that praxeological principles of behaviour were universal resulted from the assumption that certain historically shaped social trends might determine only certain forms of existence of those principles, they could not however modify their essence. It was assumed that the principles were based on the relationship of a human towards objects which was unchangeable. It was not thought, however that those principles might result from the historically changeable social relationships.

There is a formal (apparent) similarity of standpoint of subjective approach and the stand point of classical economics. The latter understood laws of economics as laws of nature, as it assumed that social relationships as demonstrated by the laws were eternal and natural. The laws of economy were objective laws of objective reality for classical economics, analogically to laws of nature. In the subjectivist approach however, the laws of that science were synonymous with the praxeological principles of behaviour focused on the maximization of usability or preference.

However, realistically (not apparently) the range of applicability of praxeological principles of behaviour in business — as opposed to what results from subjectivist approach — is limited and historically conditioned, similarly as the range of most laws of economy. Before the appearance of goods production and goods and money exchange, business operation was of a traditional character. It means that it was not a field of activity which would be governed by the principle of economy as is the case nowadays in the contemporary enterprises.

The criticism of subjective trend was made by the representatives of the historical approach. They referred to the objective idealism of Hegel's philosophy which advocated the existence of "nation's spirit" as a principle organising the development of human societies. The representatives of that type of thinking — while rejecting the laws formulated by classical economics — claimed that one could not discover laws of science in the development of human society (as opposed to nature). Thus, they argued that economics might not be theoretical (nomological) science, but rather historical, similar to the history from the idiographic perspective. That caused the later representatives of historical school (the so-called younger historical school) to prefer more often the problems of economic history rather than theory economics.

The common feature of the trends in economics discussed above is the fetishisation of social relations and laws of economy. One may distinguish two types of fetishisation.

These are: Supra naturalistic fetishisation consisting in perceiving sources of economic relations and laws of science in the supernatural sphere; it is adopted by historical approach which claims that "the spirit of economic period" allegedly influences the shape of economic relationships. Naturalistic fetishisation which consists in searching for reasons forming social relations and laws in the sphere of alleged laws of nature; that type of fetishisation is present in the classical economics, which understands the laws of economy as laws of nature, moreover it is present in the subjectivist approach which sees economic relations as an expression of universal principles of rational economy, and thus of praxeological principles, unconnected to the historical background.

As far as the types of economic laws discussed above are concerned it needs to be noticed that:

- one may accept the idea that each law of science acts exclusively in strictly defined conditions and as a consequence any change of conditions leads inevitably to a situation when some laws give way to other laws created by the new, converted conditions,
- it does not change the fact that the position of Lange on the economic laws does not solve the dilemmas
  of the validity of laws of science formulated from general methodological point of view.

### 4. Nancy Cartwright about Explanation, Truth and Idealization

Nancy Cartwright in her book *How the Laws of Physics Lie* advocated a theory that laws of physics are false. Her argumentation went as follows:

Let's imagine a loaded particle moving in the real world by gravitation and electromagnetic powers. All those powers are growing vectorial, creating thus the resultant power and resultant acceleration. Yet, the acceleration related to each individual power does not exist in reality. Thus, the gravitation and electromagnetic laws are false. In that sense the laws of physics lie, as the title of Cartwright's famous book *How the Laws of Physics Lie* (Nancy Cartwright, 1983) demonstrates. One needs to observe that when a given particle is exposed to a simultaneous operation of two powers, then the estimation of value of each of them separately involves leaving aside the other.

One thus needs to introduce an idealizing assumption, skipping the other component of the resultant power. Statement based on the assumption would thus be an idealizing statement. If so, it will not be false, but it will be true, as it has been emptily fulfilled. If treated literally, the argumentation of Nancy Cartwright fails, if one understands the idealizing character of the basic laws of physics.

One may, however, treat Nancy Cartwright's argumentation metaphorically as expressing puzzlement at the fact that the emptily fulfilled statements are used for reconstruction of statements about "real world". This is what specification consists in — one always gets to the idealizing statements from the factual statements. When treated metaphorically, Cartwright's argumentation results from failure to understand the possibility of realistic interpretation of idealizing statements. Meanwhile, such possibility exists.

#### **5.** Conclusions

The belief in the existence of law is one of the basics of the scientific worldview. It provides justification for scientific activity that would be suspended in a vacuum if there were no objective subject of its study, which are the laws of science.

The well-known author Nancy Cartwright, in a book with a significant title: "How lie the laws of physics" refuses the truthfulness of general law, leaves it with detailed phenomenological laws and — under certain specific conditions — with causal explanations.

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