Methodology of the Austrian School and Constructal Theory from the Perspective of Mircea Flonta's Philosophy of Science

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Abstract
Economic science became more and more mathematical after the Second World War. Economics initially detached itself from philosophy and used narrative argumentative language for a long time. Now economics textbooks seem the poorest relative of physics. Economists have a complex of inferiority to the physical sciences and try to imitate them as much as possible. The questions that arise are: Can humanities use physicalistic methods? Do physical methods in economics work? In addition to the classic division of sciences into ancient Aristotelian (using the qualitative method, narrative argumentation, gradual logic) and Newtonian-Galilean sciences (using the mathematical method in combination with another method) in this article, we divide the sciences differently. We separate the sciences into sciences with linear argumentation and network argumentation, according to the separation made by the philosopher Mircea Flonta. We consider the Austrian School (AS) of Economics as representative for the first type of theory, and the Constructal Theory (CT) of Professor Adrian Bejan for the second type of theory. In this article, we use the classical method of economics, i.e. the narrative argumentative method. We outline the methodologies used in current theories in the economic field. Understanding the thinking mechanism of the sciences permits to identify the strengths and weaknesses of their thinking, to avoid mistakes and emphasize the important achievements of the economy, to broaden and deepen the horizon of the mind.

Keywords
Austrian School; Constructal Theory; linear argumentation; network argumentation; knowledge.

Introduction

This article will try to explain the scientific methodology of two seemingly opposite schools of economic thought (Austrian School and Constructal Theory) from the perspective of Mircea Flonta's scientific philosophy. This philosopher divides scientific theories into two types: theories with linear argumentation and theories with network argumentation.

The Austrian School of Economics is a theory that emphasized the individual and his human characteristics (Mises, 1966). AS has always despised the use of mathematics in economics and ridiculed the physicalistic methods of human thinking (Mises, 1957). Man is an active actor, not a passive atom of life. Human behavior is not similar to that of a robot programmed to react in some way to a stimulus (Mises, 1981). Human conditionings are infinite, and the human essence is divine (transcendental) so that human behavior cannot be put into formulas. The human essence (formal cause) is action, but action with a purpose (Rothbard, 1997). People associate voluntarily and

groups have emerging properties that are not a sum of individual properties. The future is not written in advance, and science can only give anticipations in a broad - indicative framework (Smith, 1994).

Constructal Theory is a theory that emphasizes the system and in which individuals are simple nodes in the system. The theory goes from the system to the individual. It is a physicalist theory (it is a theory derived from thermodynamics) and strongly mathematized (Bejan & Zane, 2012). The holistic image is of a flow system. Inside the system, everything goes according to mathematical ratios. There must be a motor that causes leakage; flow channels are connected by a mathematical ratio; there is a diffuse flow; there are speed ratios between different types of flow; there are mathematical relationships between flows, channel types, and the external environment (Bejan, Gunes, Errera, & Sahin, 2018). Mathematics is the master of the system, nothing happens without her knowing. The goal is to dump points and transport as much cargo as possible and as quickly as possible.

Knowledge analysis

Independent thinking begins in Greece with the separation between 'what appears to be' and 'what is'. More precisely between appearance and existence. These concepts are the faces of the same coin, a coin called a primordial substance. Philosophy begins with two attempts. The first, to understand existence in its reality, to descend through thought to the ultimate foundation, and the second attempt, to orient human action based on the knowledge of true existence.

The Greeks have two ways of knowing: one obscure through the senses, the other authentic through the thought, separate from the first. Truth is revealed to reason, and the senses are opposed to knowledge. Only the intelligible has existence. The Greeks could not think of the movement and dressed the movement in the wave of appearance. The reality was motionless to them and could be captured in the form of reason. For them, movement was only appearance, and existence was motionless. Materiality represents movement and imperfection, and ideality is immutability. To enter the world of Plato's absolute ideas, a particular and special faculty is needed. This world is motionless and separate from the world of moving phenomena. The movement is misunderstood and depressed. Work is devalued and sent to the tail of existence (Andrew, 1953).

For Aristotle, on the other hand, the ideal forms belong to this world; they are involved in the world of phenomena, in the world of experience. Aristotelian forms have the same qualities as Platonic ones, they are eternal and immutable. For Aristotle there are four types of causes: the formal cause, (the plan, his sketch); the final cause, (the purpose of a thing); the effective cause, (which propels a thing) and the material cause, (the composition of a thing). Science deals with the study of formal causes. The material cause is accidental, so the essence of a thing is the formal cause, the cause that can be thought and understood (Ayer, 1956).

Concepts of knowledge

In general, an ordinary person has certain intuitions about the truth value of some knowledge. It can categorize certain information as knowledge without being able to argue in this direction. In the textbooks of scientific methodology, in principle, everything is reduced to the two competing approaches: the descriptive approach and the normative approach. The two approaches are opposed to each other and generally, in the intermediate area, there are few occupants (Chislom, 1977).

Everyone wants to gather information. It is an almost primitive elementary form of knowledge. Information narrows the scope of possible actions, reduces uncertainty and risk. A person can be assimilated into a system of information transformation. There is sensory input and a behavioral or action output. Any system that works based on information has a certain ability to filter various types of information. After the information is filtered and classified, the concept cover falls on it.

The superior type of information is the semantic information that appears in semantic representations. These are the words of a natural language. Words carry information and meaning. The next logical step is the judgments that appear by uniting the initial elementary meanings. Notions are those that subsume things and events with the help of judgments. Judgments are linked by reasoning, and logical inference produces the leap of thought between different semantics. So semantic information can rise, build on another semantic information.

To explain the emergence and development of science, a separation between explicit knowledge and implicit or tacit knowledge (emphasized in the economic field especially by Hayek) is necessary. Science focuses on explicit propositional knowledge that is based on recorded information. Science lends itself to a certain type of argument, is transmitted through a certain type of language, and must be based on a certain objective basis.

It has always been the envy of *a priori* statements in science. A statement is *a priori* if we understand it instantly without any experience, that is, it was already in a latent state in our consciousness and was waiting to be revealed. *A priori* judgments are independent of direct knowledge through experience. The truth of these judgments is necessary and universal; these judgments are true in every possible world.

Experience-based *a posteriori* judgments and logic-based *a priori* judgments correlate and coordinate with each other, but they do not necessarily remain distinct.

Literature review

Knowledge with foundation

The research we will want to undertake through this paper aims at results full of substance that contribute to the enrichment of economic knowledge, built on solid foundations, and that goes beyond subjectivism.

Ideas do not exist as ideas in isolation. For a sentence to be framed in the concept of an idea, it must be related to other ideas. All knowledge is a network of ties and knots like a fishing net. Links between ideas are inferential, and these relationships build an individual's behavior, more precisely his way of acting. During the scientific analysis, the links between ideas must be broken and analyzed separately, an aspect that distorts them and dilutes their real impact on real and intellectual life.

In economics, we attribute ideas to other people based on how they act. A person's behavior makes us infer the idea that that person is thinking in a certain way and assign a mental activity of a certain origin to that person.

Much of the scientific activity is based on faith. Faith is the idea without an objective foundation but which seems to guide the behavior of scientists. Faith is the spontaneous mental activity of trusting in statements without having on its side some significantly valuable grounds. Only after the formation of faith and based on it do we build objective truth. This truth has the connotation of a connection (of correspondence) between facts and argumentative judgments based on faith (Lehrer, 1990). The truth has two guards. One is the elimination of errors and the second is the gain of explanatory importance (information supply of truth).

One last element that intervenes in the construction of knowledge is the foundation. The foundation is the mental action expressed in meaningful arguments by which we support a certain idea and turn it into knowledge. We produce grounds for what we believe. The establishment is essential to separate necessary and universal truth from accidental truth.

Usually, in the theory of knowledge, the filters of knowledge are formulated and established first, i.e. the criteria by which it is established what is justified and what is not. The result is the dimension of knowledge, to which human thought can extend. For example, empiricists put the filters of knowledge in experience, and rationalists in the human mind. The philosophy of common sense combines the two criteria.

A common way of thinking is that we have certain knowledge, from which we start in argumentation. This knowledge of departure is implied in a certain conversation. They exist, we understand that they exist, we are not aware of them and we do not put them on the sheet. But their existence is undeniable. As long as we have no reason to question them, to bring them out of the subconscious in the light of the argument, they act and do their job behind the scenes in everything we do mentally. If the senses give us the wrong information we have to prove it, otherwise we take for granted what they give us (Locke, 1961).

In economics, we must constantly ask ourselves what are the necessary and sufficient conditions for a theory to be legitimate from the point of view of sound knowledge? We must consider not only what is or has been in the construction of the concept of knowledge, but we must also consider what is possible. Not only the current processes of selecting true knowledge must be taken into account, but also future or possible courts, courts that will decree the truth.

The first decree of the foundation of knowledge was made by Plato. The truth of ideas must not be the fruit of chance, although the truth can be drawn from unfounded premises.

In everyday life, there is a difference between true information and knowledge. Knowledge needs grounding as a criterion, and true information only needs to prove correct in a particular situation. Among the various opinions of what knowledge means, one of them puts three conditions: truth, acceptance, and foundation.

Unfounded knowledge

The well-known philosopher of knowledge Karl Popper believes that we can progress in science without the help of sound scientific hypotheses. Knowledge is not based on a foundation. Popper believes that basic statements can be adopted by the world of science through a decision. A hypothesis doesn't need to be based on empirical statements given by the senses or on observations and experiments or other well-founded hypotheses. Instead, the hypotheses can be falsified because they give us ideas about the flexibility of some theories. Induction is a lie, Popper believes, a theory can only be refuted and never confirmed. A functional theory is a theory that has withstood all attempts to overthrow it. Researchers who seek grounds for certain theories do an unscientific act of distorting true scientific knowledge.

A foundation of knowledge can only be achieved in three ways. All three paths run into logical problems. 1. The substantiation of an argument can only be done using another argument and so on indefinitely. 2. Using an argument using the same modified argument and thus the circularity of thinking occurs. 3. The use as a basis of argumentation, hypotheses that build on themselves. Only the third path is used without getting into logical construction problems. We start from the hypothesis that there is directly intuitive knowledge of the truth, which is based on itself (Flonta, Nagăţ, & Ştefanov, 2004).

Popper attacks the rationalists. He considers that the assumption of building a theory on absolute rationalist assumptions only removes that theory from the field of fallibility verifications. The rationalist argumentative basis, Popper considers, is incompatible with fallibility. Popper's enemy is a theory based on an archimedic point, where the truth is revealed directly or based on itself.

Popper is wrong: if it is considered that an argument about the world or about an individual can be lowered to a point that is based on itself (and no longer needs to be founded), this does not mean that this point is accepted without reasoned discussion. This archimedic point of knowledge can be changed, it can be wrong.

Clarification of the objective concept of knowledge

We have true knowledge when there is coordination between the truth of an argument and the grounds for supporting that judgment. The truth thus formed is no longer accidental. Knowledge with reason filters separates accidental opinions from the truth supported by arguments. The philosophy of knowledge speaks of the concept of

founding without error. This means a judgment that is based on itself. That is a knowledge whose significant alternatives can be rejected following sound judgments.

Scientific knowledge wants to be objective knowledge par excellence. Objectivity represents altruistic substantiation; with solid bases; independence of interests and use of restrictive and severe conditions. The ideal of scientific knowledge can be summarized in: approaching the truth and relying on directly given information. At the same time, the results of scientific research must be communicated intersubjectively and be able to test intersubjectively (Flonta, 2008).

In the problem of communicable knowledge (intersubjective) appears the problem of the relationship between signs and the reality designated by signs. Any information contained in knowledge must be filtered by pure, subjective experiences. These experiences cannot be really communicated, but are transmitted only as metaphors, using analogy.

Scientific knowledge and subjective experience are two facets of the same coin. These facets can be replaced by the notions of expressible and inexpressible. The feeling cannot be transmitted through concepts, it just exists. Knowledge can be transmitted through concepts arranged (according to logical rules) in concepts. A sentence is scientific only if it is coordinated by formal relations between concepts. These concepts express objects or phenomena.

In the discourse of scientists and even philosophers it is stated countless times that they manage to penetrate directly, intuitively the essences, i.e. the ultimate reality. Intuition has become a kind of superior and appreciated knowledge. We, in principle, consider that these intuitions refer more to subjective feelings than to knowledge.

We consider that knowledge is the description of the properties of things and the connections between them, with the help of concepts and judgments. The senses only give us things, the substance of knowledge and not knowledge. Intuitions are inner states. If knowledge is a repetition of things by constructing images of them and passing objects inside the mind, the question arises. Are images true?

The passage of the object from the outside of the mind into it by the construction of an image by a certain organ (whatever it is) cannot be done by a faithful copy. The properties of objects are, in fact, states of consciousness. Knowledge begins by building symbols for what is outside. The explanation is a symbol changed by an association of symbols. Scientific knowledge only permanently reduces the number of symbols. That is why an essential criterion in science is univocity, a meaning, and a symbol.

Among the criteria of science can be listed the possibility of control (among scientists) of scientific results and concepts that claim to represent reality. A scientific judgment must be connected with other scientific judgments considered objectively true. They must not depend on the subjective feelings of scientists. Example: connecting a scientific hypothesis with arguments based on observational or experimental information.

In modern science, some statements are considered not to be directly evaluated and controlled by experience. Here certain judgments can be framed about facts that cannot be reproduced systematically, and the empirical effects are unclear. On the other hand, logical empiricists created the verificationist theory of meaning. In this theory, they tried to impose clear rules and conditions for a judgment to be considered objective and scientific. The rules have empirical significance and it turns out that a hypothesis can be true or false after forcing that judgment in the straitjacket of the rules.

Beyond the internal struggles within science, science clearly tends towards clarity and accuracy of language; elimination of subjective feelings from scientific statements; improving the tools for checking, testing, evaluating the ideas that are supposed to be scientific.

But no matter what I said above, speculative (metaphysical) thinking cannot be detached from scientific thinking, from what we commonly call in everyday life, knowledge. We cannot strike with an ax of thought and separate value-based thinking from so-called empirical knowledge-based thinking. And at the same time, we cannot break the ideals of knowledge from the filters of a knowledge that has the claim of objectivity.

Scientists reject the absolute of existence and adopt the symbolic presentation of the objective world. Thus, only the structure of reality is rendered, and the qualitative content of the real world will remain for subjective living. H. Poincare limits all knowledge to symbols, relationships between symbols, and certain ways of linking these symbols to the actions of the human mind. Everything is a system of relationships.

The source of knowledge, the birth, and consolidation of knowledge

Knowledge in the ordinary sense represents both a certain type of human action and the products of this action. The action of knowledge represents the knowing functions of the human mind, and the products are the concepts, notions, hypotheses, theories. Over time, scientific research has focused, depending on fashion, on both cognitive functions trying to discover human abilities to know, and on the consequences of cognitive action.

Knowledge is directly determined by the physical tools of knowledge with which we are born. These tools give us skills with which we manage to extract the essences from the chaos of objects and events around us. These essences order life, connect things, give them meaning, and chaos becomes marginal. The tools of the human mind attach symbols to events around it and correlate them with each other. The understanding turns into an explanation, meaning that something is inserted into a three-dimensional spider's web, in which from one place you can move anywhere. As science advances, the structure of the canvas becomes simpler. Examples of tools are classification, comparison, and correlation.

The starting point is the description, and the final points are the normative filters. These filters are the conditions for sorting information as scientific or not. The most well-known scientific method is induction which establishes a connection between particular facts and scientific working hypotheses, i.e. general statements. The problem of science is the substantiation of general statements. Scientific research deals with the elaboration of scientific hypotheses or theories, and scientific substantiation deals with the establishment of the truth value of the hypotheses. Of the two, the most difficult is the logical and experimental foundation of theories (Negulescu, 1969).

At a more critical look, it results that psychology and philosophy deal with the sources of knowledge, and science deals with the substantiation of knowledge.

Adherents of intuitive knowledge accuse knowledge through notions that their only goal would be to gain means of acting on reality. The five senses give us a perspective of what is apparent and not what must necessarily be universal. That is why rationalists consider the universe to be a hierarchically correlated system in its elements. At the moment of finding the fundamental rational principles of the system, it reveals itself to the human mind in its mode of functioning.

Starting with I. Kant, a clear distinction was made between the theory of knowledge and psychology; the latter deals with the physical and mental activities that take part in the formation of knowledge. Psychology is descriptive while the theory of knowledge is transcendental. The theory of knowledge takes to prepare the information and asks about the possibility of their existence, leans on its foundation and not on its appearance.

We believe that the problem of the ultimate sources of knowledge has been counterproductive most of the time. It has often been believed that a permanent regression to the ultimate sources of knowledge will ensure certainty of knowledge. Faith is fundamentally wrong. The pure and original source of knowledge does not exist. Nothing can provide full assurance against error.

The empiricist conception of the genesis of knowledge

Primary sensory information is commonly considered to be true and not influenced by error. Mistakes appear only after the subsequent transformation of information by the apparatus of the human mind. The human mind uses the atoms of information provided by the sensory organs, atoms that resemble, compare, and distinguish. The road is sensation then observation through linguistic treatment of sensation and finally theory.

From our point of view, the perfect recording of an informational signal by our sensory organs is a legend. It depends only on our sensory organs arising from a biological evolution; organs appeared in response to some external environmental problems, probably imperfect compromise solutions to urgent problems. What if we had six senses or seven? Would math be the same? What if we had a sense of electric fields? Would the history of science be identical?

An observation is not singular. It enters a context, a cultural framework, a framework formed in time for an individual and generations for a culture. An observation is transformed by an individual's skills or cultural horizon (already existing cultural scientific hypotheses). The human mind behaves like a simple device to record only in extreme cases of illness or extreme stress. The information received generally falls within a horizon of expectations. Knowledge progresses through changes in the coordinate system held by culture and in which it organizes information. Pure observation is a story. The information received by the sense organs is framed in a pre-existing coordinate system formed in time for both man and culture.

To establish a theory, we can go on the regressive path to the child's stage, to the unconscious horizon in which we receive the information. At this stage, there are two types of theories. The first is the bucket theory, i.e. the hypotheses arise from valid information (identical to reality), received by the sensation with which the human mind then plays. The second is the theory of the flashlight, i.e. the information received through sensations is preceded by unconscious expectations.

Aristotle's followers believe that we can start from individual things and because the world has a logical and hierarchical architecture we can move from notions with small generality to notions with increasing generality (Aristotle, 1961). Hume considers, quite arguably, that between certain parameters we can establish links only after observing a certain period a succession between them (Hume, 1987). Causality is only a successive link between two phenomena whose deep mechanisms we do not know. More precisely, a systematic repetition between two or more facts. Einstein considers concepts as simple constructions of thought. He separates sensations from notions. The mind is active, it builds. The sketch of the mental construction is innate, and the material comes from the outside. The human mind breaks - undoes the sensory impressions of reality and uses them as simple bricks in the construction of the edifice of hypotheses according to its plan (Einstein, 2005).

Remaining to Einstein's conception, he considers that the information of the senses is organized by reference to concepts and the relations between concepts. The content of the concepts is sensory data, but Einstein refuses the induction and abstraction of empiricists. The relationship is between the registration number of a car and the car and not between one of the components of the car and the car. The concepts just clean up the sensations, organize and systematize them. The concept is a construction of a mind and not extracted from the reality of sensations. There is a concordant relationship between concept and sensation, not the production of one from the other. Notions only effectively organize sensations and can anticipate certain environmental information. Einstein also talks about a selection between concepts. Only those that prove their efficiency in practice remain valid. The simplest notions that effectively organize the sensations survive. The action of abstraction in Einstein's vision, that is, of extracting notions from sensations, is an illusion (Einstein, 2005).

To study how concepts appear, one can think of a way to analyze innate mental structures. The contact with the raw reality only has the role of being a triggering factor. The sensory data with which a person comes in contact are numerous, they are selected by various mechanisms and only certain data reach the consciousness (data

considered important). Thus, scientific hypotheses arise through an automatic hierarchy of sensory data. A good assessment of scientific knowledge requires knowledge of the biological structure of the human mind.

Acquisition of knowledge

There is a difference, a gap between our knowledge and the information given by the senses. We have much broader knowledge than the sensory information received throughout life by the normal senses. Sensory input is much lower than conceptual input. Even if we think of the human mind as an information processor, what results from the decoder is much broader than what it received. Thus, this can only be explained by the architecture of innate knowledge, even if we take into account the cultural context in which an individual conducts his life. Thus the problem of knowledge turns into the relationship between the innate configuration of knowledge and the information given by the cultural and physical environment.

In principle, everyone agrees that creating knowledge architecture requires both innate skills and sensory data.

One of those who talk about the poverty of input data and the wealth of output knowledge in a human mind is Chomsky. He analyzes this aspect in human language. The acquisition of a language in the first years of life cannot be explained theoretically or experimentally only by the information acquired from the environment. There are knowledge instincts that are activated if they receive the necessary and adequate stimuli. Otherwise, it is impossible to explain why we know so much and receive so little information through the five senses. Different experiments can be thought of to indicate the discrepancy between inputs and outputs and thus to indicate the role of internal configurations of knowledge (Chomsky, 1988).

Some knowledge theorists like Lakatos talk about research programs. They provide a research framework based on certain logical and philosophical principles. In a research program, one theory can be replaced by another when the old theory leads to consequences that are not verified in reality (Lakatos, 1978).

Usually (but wrongly, we believe) science refers only to data received by sensory means, able to be measured. This science builds a type of knowledge capable only of predictions and possibly control of what happens in the environment. For us, science must provide explanations for the connections seen in sensory data, to establish the truth of a hidden reality that leads to observed connections. The science that leads only to prediction and control is half science. That is why we need to reach a territory despised by scientists, in the field of speculation, statements, and deep arguments. In this place, we unearth the true principles of surface phenomena.

To clarify the knowledge, the following two concepts, sometimes mixed, must be separated: *a priori* knowledge and innate knowledge. *A priori* represents separate from experience, it is logically justified, but it has nothing to do with the genesis of the concept. Inborn refers to the source of that notion, but which does not ensure validity.

In one of the many divisions of scientists into various categories, they are divided into natives and empiricists. In the natives, the nature of the conceptions and principles of formation are established by the architecture of the mind. In empiricists the configuration of the innate mind has only peripheral processing of sensory data and has included certain inductive methods; all that matters are the inductive principles.

Decisive in knowledge and knowledge programs are the theories that are linked and mutually supportive.

Substantiation of knowledge; the objects and the manner of justification

Knowledge is ultimately the production of arguments as reasons for what is being said (in a word grounds). The price of these arguments must be recognized in a dialogue. The substantiation of statements by various arguments or reasons is called justification. That is why philosophers and scientists seek the ultimate support of their statements, from which to develop step by step the argument. As a builder, a theorist is looking for a solid, sure foundation to link his construction to. He is looking for the rock to ensure its construction in the face of attacks from the external environment. The architecture of a building can be remade, readjusted in time, but its foundation is sought to be absolutely fixed (Monod, 1991).

During the historical and civilizational evolution, the foundations were changed according to the cultural context and the evolution of mentalities. Individual mental processes and emerging intellectual states are in a permanent transformation. The truth evolves, and it is the claim to know a culture. Knowledge wants to connect rigorously to the truth, but the target is moving. Thus, judgments also adapt and evolve, arguments become complicated and fake.

Knowledge is seen as a process to substantiate our opinions. The foundation must be linked to the notion of truth intuited by a culture, otherwise, everything becomes absurd. To use an argument, we must have a purpose in actually supporting that argument. In using arguments, the gaze must be constantly directed to the ultimate goal, which is the truth. When reading a scientific justification, we must always ask ourselves how safe it is.

Subjective feelings cannot be the object of cognitive substantiation. Only claims that can be true and verified can be substantiated. That is why the substantiation connects with the description. The description may be the object of a judgment may be subject to argumentation correlated with the truth. The description can be assessed as justified or not. The condition of knowledge is the substantiation. We refer to conscious, explicit knowledge formulated in sentences. Some authors, those who speak of innate knowledge do not approach very strictly this concept of substantiation of knowledge. However, this concept remains a strict condition of scientific knowledge (Descartes, 1990).

In common parlance, the word conception refers to evasive notions and even includes mental structures and ways of behaving. But in the strictly scientific sense, it refers to substantiated notions and judgments.

To understand science we must understand and accept a very important aspect. There are two types to justify a theory: linear and network, which will be discussed in the following subchapters. In both of the above cases, there is a need to define criteria for an argument to be recognized as scientific or not.

The illusion of absolute scientific knowledge was based on the illusion of an absolutely true unique foundation. That is, a true foundation no matter what people believe, know or feel. A kind of archimedic point that can turn the world upside down.

For Aristotle, the archimedic point is the data of the senses. Direct knowledge is given by intuitive thinking, and finding the essences or principles is done with the help of induction. The sensation is a manifestation of a cause. The activity of the mind starts from perceptions and identifies the causes through a mechanism called induction. Rationalists (descendants of Descartes) seek the certainty of truth in the record of logic and reason; in logical insertions lays the guarantee of truth. Empiricists or focused on what is given to our senses as a source and foundation of knowledge.

Methodology

In this article, we used the classical method of economics: narrative argumentation. We used the ancient Aristotelian type of argumentation with a qualitative logic in which the separation between concepts is gradually of the Hegelian type. From the contact with the practical and theoretical economic reality, we extracted the essences, i.e. the formal cause. We tried to illuminate these essences only from the point of view of the final cause, that is, of the purpose. We followed the line of argument from downstream to upstream, a method typical of the socio-human sciences.

Results and discussions

The linear foundation of scientific knowledge: the Austrian School of Thought

The activity of linear scientific knowledge is based on privileged statements compared to others. The activity of justifying a statement is of the linear type, in steps - digitally, by logical inference. In this type of substantiation, we integrate the Austrian School of Economics (Hayek, 1973). By virtue of this idea, the question is: how will the basic statements appear in such a hypothesis? Those are the statements from which they start and are not supported by other statements. Another question that arises is: how should the linear justification of a theory appear? It is of the type: inferential justification. The justifications must be consistently stable in the cause-and-effect stages (Kirzner, 1996).

The basic statements build on themselves and at the same time substantiate the scientific knowledge above them. In their absence, science cannot be grounded and the arguments would regress indefinitely or go in a circle. Science-based statements must be free from errors. In this type of substantiation, the basic statements are direct. That is, they are those who do not enter into relationships with other statements to

establish their value of truth. The truth is contained in them without the need to relate to the truth of other statements (Flonta, 2008).

The size of the steps is a problem to be analyzed. Each argument sets a leap. The leap must be considered acceptable from the point of view of the scientific argument; that is, not to be considered unlikely. Each argument must lower the jump to a critical dimension when the two sets of arguments on either side of the jump are considered to be plausibly derived from each other. Any jump includes a gap between the two types of arguments. The precipice must be narrow enough that the jump is not perceived as too large and with a low probability of success.

The type of report must be established between the judgments that come one after the other, and the type of report forms a system of knowledge.

In the presented linear argument, a terminus must be found to avoid the two very well-known problems of science: the regression to infinity and circularity. The basic statement must be self-validating, it must not refer to other statements or data of the senses (as empiricists consider). The information given by the sensory organs alone cannot be transformed into truth.

The basis must be connected to the truth directly and clearly without connection even with the logic of the manual. We consider a basis safe until evidence to the contrary appears. This last evidence has a greater certainty or evidence of the truth.

The linear foundation builds a pyramid-type knowledge architecture. The ideas at the base of the edifice of linear-type knowledge are rooted (after all) in the data of the senses, in the events of direct experience. The biggest difficulty with linear configurations is the credibility of the underlying statements.

Network-type substantiation of scientific knowledge: the Constructal Theory

Network theories disregard the basic ideas that are self-validating and on which an edifice of knowledge is built. Network theory bases its truth on the truth of the whole. The elements are integrated into EVERYTHING, the whole must be coherent and not just a part of it. The whole should be coagulated under a unitary vision (Flonta, 2008).

An idea has value only inserted in a context of ideas, in a network of ideas. Only a fine lacework of interwoven ideas forms science. Each idea is a node in a large three-dimensional network connected by wires to other nodes. Each thread represents justifying inference. The foundations of an idea are knowledge from another part of the network. An idea is a new idea for one part of the system and it is a fundamental idea for another part of the system. The substantiation of knowledge, in this case, is circular; the statements reinforce each other and have the same value. The system as a whole must be cohesive - coherent. In principle, the basic statements are indirect, those for which the establishment of truth values we need to resort to other statements whose truth we assume we know. Different types of judgments are used to link one truth to another (Bejan, 2016).

All ideas within a system have the same value of truth, there are no prime truths. In the network system, however, some principles form the hardcore of truth; principles to which all the following arguments connect. No statement is favored in one way or another, no information system (of pure senses or thinking) is more advantageous. The central truths of a network system form a kind of collection of arguments.

The network knowledge system is based on a holistic vision in which there are no derived and first-order statements, direct and indirect truths. All the statements of a theory are interdependent with each other, they support each other. An argument is assimilated to a system; it is embedded in a large and vast network. By no means is there a regression in the study and analysis of a theory towards the basic argument. The network knowledge system states that the observations of an empirical nature are supported by various arguments of a rational nature and with a certain degree of generality. The substantiation of the truth and the connection with the reality of such knowledge (of the network type) ends only in circularity. To determine the truth value of information, it must be related to other knowledge. The whole must be coherent and not just a certain part. At the same time, it is insufficient for a system to be coherent in (say) the five parts of which it is composed. Its five parts must be coherent with each other (Bejan & Errera, 2012).

These knowledge systems, however, have a nuclear core area made up of principles that cannot be changed without changing the meaning of the whole and a peripheral area made up of statements that can be changed or eliminated without changing the architecture of the whole. I could even think of a decrease in importance from the center to the periphery with a certain gradient. The elements at the periphery may even be modified to meet the precepts of the center. What is very important is the logic and rationality of the system so that the individual elements are of secondary importance to the rational configuration of the whole. The nodes of the network of ideas, the relationships between ideas in the form of judgments and arguments can change, but the coherence of thinking of the whole must be maintained. The whole system self-evaluates and self-corrects, parts of it change, but not the whole system at the same time but eventually in parts at different times. Rational coherence is not enough to configure a system. The objective truth of this system is also necessary. That is, to maintain a strong and unaltered connection with the reality of existence. Ideas within a system are mutually supportive, but they must be based on reality.

The starting point of a theory cannot be absolutely true. It is an illusion to believe that one can leave a place that will no longer need to be revised. Within a theory (regardless of the network or linear type) the place of departure must be constantly re-analyzed from the perspective of the truly important achievements of a theory. The truth must be the target and not the coherent logic of the system as a whole.

All knowledge theory textbooks present three steps on the emergence of a theory. One, a hypothesis that seems credible is constructed, the creative imagination is used. Two, the theoretical implications derived from the hypothesis are tested empirically by observation and experiment. Three, compare the test result with the initial hypothesis.

In the evolution of a theory, any structure of it can be corrected in the light of new results from observations, experiments, or even theories in other fields. The ideational atoms of a system must interact and be reviewed as they go. They must maintain permanent contact with scientific reality (observation and experiment).

One of the mistakes of network-type thinking is that the connection between the knowledge system as a whole and the empirical world is secondary and the connection is relatively weak. Scientists who are followers of such a system look marginally at the connection of reality with the logical beauty of the system. Ideas that connect to the data of the senses have a marginal status within the system. Only the periphery connects with the sensation and not the ideational central nucleus. It must be borne in mind that the truth is not given by the logical beauty of a system but by its connection with observational and experimental reality. Network theories are related to psychological mechanisms. The first time an event is identified in terms of its essential properties; then these essences are inserted into a coherent system of beliefs. The evaluation and selection mechanisms within the system determine whether the information is valid and can be integrated into the network of ideas or is rejected because it is not true from the point of view of the system as a whole. Knowledge becomes scientific when it is approved by the verification mechanism and is in line with the core of ideas.

Conclusion

To begin with, we will try to clarify according to the table below the difference between the various approaches:

Table 1. The differences between Flonta's approach and other approaches

Author's name	Methodological conception
Karl Popper	The basis of scientific hypotheses is unimportant. Only the possibility of falsifying a theory is important.
Logical empiricists	Clear rules and conditions are required for a judgment to be considered scientific. The rules have empirical significance.
Kant, Einstein, Chomsky	Reality influences our senses and they give us the primary data; this information is processed by the innate mental apparatus equipped with complex tools that transform the initial data broadly and profoundly. The human mind contains a priori data and mechanisms.
Aristotle, Logical empiricists	We start from the data of feelings and use induction as a process of gradual abstraction.
Hume	Causality is just a statistical assumption.
Kuhn	Certain methods, rules, norms are used that outline a paradigm. The paradigm is a problem of cultural evolution and deep psychic structures of civilization (Kuhn, 2008).
Flonta	It is important to base thinking on an obvious statement logically or empirically from which to develop the argument linearly (brick by brick) or in multiple network connections.

There are two types of scientific theories.

The first type: foundationalists with a unitary logic, the basis is represented by an obvious axiom in itself, the rest is built by logical or factual deduction. AS is this type of theory (Rothbard, 1997). It is based on the *a priori* axiom of human action and on several other ancillary principles and axioms. On these AS builds by deduction an entire economic theory (Menger, 2016).

The second type: coherent with a circular logic; they have central elements that form a hardcore and elements on the observational edge. CT is a coherent theory with a central core and marginal edge elements. The central idea is: everything is a flow of mass and energy; the goal is the intensity of the flow (Bejan, 2020). From the center go the ideas radially to the periphery: the notions of flow system with its dimensions, flow material, flow motor, flow brakes, characteristics of the flow environment (Bejan, Errera, & Gunes, 2020).

Given Chomsky's assertions about the human mind that the inputs of the human mind are too weak to validate outputs, we can argue that in economic knowledge there is *a priori* knowledge whose development leads to ideas that can be empirically verified. This is also true of the Austrian School and Constructal Theory. Such thinking mechanisms explain the poverty of empirical inputs and the theoretical richness with great explanatory and anticipatory capabilities. It would be impossible for economics to exist as a science if it were based only on sensory, direct empirical data (input). Economists notify the whole and then explain to the parties.

Theories that want to exist only by reference to empirical data of observation or experiment without being based on other ideas (or to be integrated into a system of ideas) are completely erroneous and simple illusions. An idea must have its roots in the data of the senses and at the same time have the crown in a logical and rational system of knowledge. Acceptance of an idea depends on a conditioning mechanism beyond the core of knowledge.

The sensory information that science has at a given time must support the scientific knowledge that forms the center of a system of ideas. The problem is how these theories will manage to overcome the sensory data held and to anticipate other information (following possible observations and experiments). Two aspects need to be studied. The first is the connecting relationship between the input and the relational logic system as a whole. The second is the relationship between the relational system and the output of ideas, at the level of empirical data which are anticipations.

A little forced we can think of the relational system of ideas as a species in which on the one hand there are mutations in ideas, and then comes the selection system that is directly related to reality and finally keeping ideas that have become viable in contact with observations and experiments.

The limitation of Mircea Flonta's approach refers to the possibility of the truth of the basic or central assumption. Errors can be like: based on another foundation and so on

indefinitely or based on the same modified argument that leads to the circularity of thinking. In the end, an argument based only on himself remains an ideal we strive for, but never reach.

References

Andrew, G., & Melsen, V. (1953). *The Philosophy of Nature.* Duguesne University Press.

Aristotel. (1961). *Analitica secundară [Posterior Analytics]*. Scientific Publishing House.

Ayer, A.J. (1956). *The Problem of Knowledge.* Penguin Books.

Bejan, A., & Zane, P. (2012). *Design in nature. How constructal law governs evolution in biology, physics, technology, and social organization.* Anchor Books.

Bejan, A. (2016). *The Physics of life*. Martins Press.

Bejan, A. (2020). *Freedom and Evolution. Hierarchy in Nature, Society and Science*. Springer Nature.

Bejan, A, & Errera, M. R. (2017). Wealth inequality: The physics basis. *Journal of Applied Physics 121*,124903. https://doi.org/10.1063/1.4977962

Bejan, A., Errera, M. R., & Gunes, U. (2020). Energy theory of periodic economic growth. *International Journal of Energy Research, 44*(7), 5231-5242. https://doi.org/10.1002/er.5267

Bejan, A., Gunes, U., Errera, M. R., & Sahin, B. (2018). Social organization: The thermodynamic basis. *International Journal of Energy Research, 42*(12), 3770-3779. http://doi.org/10.1002/er.4093

Bratianu, C., & Bejinaru, R. (2019) The Theory of Knowledge Fields: A Thermodynamics Approach*. Systems, 7*, 20.

Chisholm, R. M. (1977). *Theory of Knowledge.* Prentice Hall.

Chomsky, N. (1988). Despre structurile cognitive şi evoluţia lor; un răspuns lui Piaget [About cognitive structures and their evolution; an answer to Piaget]. In C. Mare, E. Popa, I. A. Popa, & M. Toader (Eds.). *Teorii ale limbajului. Teorii ale învăţării, Dezbaterea dintre Jean Piaget şi Noam Chomsky [Theories of language. Theories of learning, The debate between Jean Piaget and Noam Chomsky]*, Political Publishing House.

Descartes, R. (1990). *Discurs asupra metodei [Discourse on the method].* Academiei Publishing House.

Einstein, A. (2005). *Cum văd eu lumea [How I see the world].* Humanitas.

Flonta, M. (2008a). *Perspectivă filosofică şi raţiune ştiinţifică. Presupoziţii filosofice în ştiinţa exacta [Philosophical perspective and scientific reason. Philosophical assumptions in exact science],* Scientiphic and Enciclopedic Publishing House.

Flonta, M. (2008b). *Cognitio. O introducere critică în problema cunoşterii [Cognitio. A critical introduction to the problem of knowledge].* All

Flonta, M., Nagăţ, G., & Ştefanov, Gh. (2004). *Introducere în teoria cunoaşterii ştiinţifice [Introduction to the theory of scientific knowledge].* Universităţii Publishing House.

Hayek, F. (1973). *Law, Legislation and Liberty.* Routledge.

Hume, D. (1987). *Cercetare asupra intelectului omenesc [Research on the human intellect],* Scientific and Enciclopedic Publishing House.

Kirzner, I. (1996). *Perspectiva economică [Economic perspective]*. All.

Kuhn, T.S. (2008). *Structura revoluţiilor ştiinţifice [The structure of the scientific revolutions],* Humanitas.

Lakatos, I. (1978). *The Methodology of Scientific Research Programmes.* Cambridge University Press.

Lehrer, K. (1990). *Theory of Knowledge.* Routledge.

Locke, J. (1961). *Eseu asupra intelectului omenesc [Essay on the human intellect]*, Scientific and Enciclopedic Publishing House.

Menger, C. (2016). *Principiile economiei [The principles of economy]*, Liberalis.

Mises, von L. (1957). *Theory and History*. Yale University Press.
Mises, von L. (1966). *Human Action*. Henry Regnery.
Mises, von L. (1981). *Epistemological Problems of Economics*. New York University Press.
Monod, J. (1991). *Hazard și necessitate [Chance and necessity]*. Humanitas
Negulescu, P. P. (1969). *Problema cunoașterii [The problem of knowledge].* Academiei Publishing House.
Popper, K. R. (1981). *Logica cercetării [The logic of research].* Scientific and Enciclopedic Publishing House.
Rothbard, M. N. (1997). *The logic of Action: Method, Money and the Austrian School*, Edward Eldgar.
Smith, B. (1994). *Austrian Philosophy*, Open Court.