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WHAT COMPONENTS DOES A SPECIFIC SCIENTIFIC THEORY CONSIST OF? (Part 2) [1]

By specific theories, we mean scientific theories that focus on particular types of material reality or phenomena, such as elementary particles, plasma, superconducting materials, quantum tunnelling, chemical reactions, gene regulation, tectonic plate movement, and the Universe.

[1] See the first part of the article: Gabovich, O., Kuznetsov, V. (2025). What components does a specific scientific theory consist of? (part 1). *Philosophical Thought*, 4, 131—149.

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After examining various visions of the theory division into components proposed by some of the prominent scientists (Isaak Newton, James Clerk Maxwell, Heinrich Rudolf Hertz, Pierre Maurice Marie Duhem, Max Karl Ernst Ludwig Planck, Albert Einstein, Norman Robert Campbel, Percy Williams Bridgman, and Gerardus (Gerard) 't Hooft) and philosophers of science (Carl/Karl Raimund Popper, Thomas Samuel Kuhn, Imre Lakatos, Paul Karl Feyerabend, Mario Augusto Bunge, Ronald Nelson Giere, Joseph Donald Sneed, Wolfgang Balzer, and Carlos Ulises Moulines), one finds that these visions fail to consider all essential components and omit many important details, even of the chosen components. Incomplete and undifferentiated visions, on the one hand, overlook many critical features of a theory, including its development and connections with other theories. On the other hand, such visions often generate pseudo-problems, such as the incomparability of classical and quantum theories. As theories underpin the modern sciences, such perspectives lead to oversimplified and overly general understandings of science and its progress. The article briefly emphasizes the significance and utility of the polysystemic vision of specific theories and their development within history, philosophy, sociology, and the pedagogy of science. The first part of the article presents the types of components and physicists' views of theories. The second part addresses the views of philosophers and our conclusions. We emphasize that in the first part, we described a bridge between Newton's unfading pattern of scientific theory and the newest trends in the interpretation of modern physical theories. It is a clear example of the Western scientific tradition of both continuity and change, so that the final product looks different, but its structure remains stable, familiar, and convenient for professionals. That is why it is quite possible for a modern-day scientist to read Newton and find statements useful for his practical activity, not to talk about specific pearls created by the genius.

Keywords: *specific theories; complexity; types of components; polysystemic view; subsystems.*

Answers from philosophers of science

From the aforesaid (see the first part of this study), it seems that physicists have left the analysis of theories to philosophers. However, reading philosophical and sociological works on theories creates an ambivalent impression. On the one hand, many philosophers follow the majority of physicists who conduct research without fully recognizing the composition of theories. Philosophers also discuss theories without clarifying what they mean by 'theory' and its internal components. On the other hand, physicists are quite successful in using theories to understand realities that fall within the domain of those theories. It is debatable how effectively philosophers succeed in analyzing science and its development, without offering a detailed explanation of the components of theory and their interdependencies.

Whatever the case, it is currently challenging to find facts regarding the significant influence of philosophical studies on physicists' cognitive activities. Indeed, endless philosophical disputes about the nature of the theory do not mean that philosophers are as successful as physicists in their research areas. Truly, while all philosophers of physics and science as a whole use the word "theory", not all of them explicate their views on the theory's composition. In any debate about the nature of theory, at least one of the world's renowned but rival philosophers of science is mentioned, supported, or criticized. We have in mind Mario Bunge (1919—2020), Paul Feyerabend (1924—1994), Ronald Giere (1938—2020), Thomas Kuhn (1922—1996), Imre Lakatos (1922—1974), and Carl Popper (1902—1994), They are authors of many books and articles, some of which are devoted entirely or partially to abstract and specific theories. Anyway, the term 'theory' is presented practically on every page of their numerous works. Ironically, these pillars of contemporary philosophy of science rarely reveal the structure of theories. Perhaps they believe that their reader shares their understanding of the theories. Alternatively, perhaps they are confident that the answer to the question about theory components is trivial and well-known, and therefore does not require explication.

We examined some of their magnum opuses and discerned the authors' visions for the composition of theory. We consider only these works, not their numerous retellings, mutually exclusive interpretations, and apologetic, critical or neutral analyses (Frigg, 2022). Supposing that in some cases, the sentences or paragraphs beginning with phrases "theory is" and "theories are" contain information about the composition of a theory, firstly, we searched for that information through their publications, correspondingly, *The structure and content of a physical theory* (1967), *Against Method* (1975/1993), *Explaining Science. A Cognitive Approac*h (1988), *The Structure of Scientific Revolutions* (1962/1970), *Philosophical Papers* (1978), and *The Logic of Scientific Discovery (*1959).

Below is what we got.

"Scientific theories are universal statements. Like all linguistic representations, they are systems of signs or symbols. Thus, I do not think it helpful to express the difference between universal theories and singular statements by saying that the latter are 'concrete' whereas theories are merely symbolic formulae or symbolic schemata; for exactly the same may be said of even the most 'concrete' statements" (Popper, 1959: p. 37).

Theory is "a conjunction of a testable and a non-testable part" (Popper, 1959: p. 66).

Reviewing textbooks on classical mechanics, Ronald Giere stated that theory is "comprising two elements: (1) a population of models, and (2) various hypotheses linking those models with systems in the real world" (Giere, 1988: p. 85). He also mentioned the language in which the statements about models are formulated, but excluded it from the theory composition.

Some information on the theory's alleged composition can be gleaned from Feyerabend's somewhat vague passage: "We have a point of view (theory, framework, cosmos, mode of representation) whose elements (concepts, 'facts', pictures) are built up in accordance with certain principles of construction. The principles involve something like a 'closure': there are things that cannot be said, or 'discovered', without violating the principles (which does not mean contradicting them). Say the things, make the discovery, and the principles are suspended.

Now take those constructive principles that underlie every element of the cosmos (of the theory), every fact (every concept). Let us call such principles universal principles of the theory in question. Suspending universal principles means suspending all facts and all concepts. Finally, let us call a discovery, or a statement, or an attitude incommensurable with the cosmos (the theory, the framework) if it suspends some of its universal principles" (Feyerabend, 1988: p. 205).

And that is all. A somewhat surprising result. To confirm this, we then searched these books for words that, in context, could indicate the composite nature of theories. These words are "component," "element," "part," "structure," "ingredient," "constituent," "formula," and "variable". Such indications were absent in all the books considered.

During these searches, we also suddenly realized that all those authors use the term "theory" to refer not only to specific scientific theories, such as quantum theory and Newton's theory of gravity, but also to fragments of speculative knowledge that genuinely lack recognized scientific status. These fragments are merely an exposition of the authors' fuzzy ideas and beliefs concerning such theories. The most notable point is their reference to the theory of knowledge. However, despite its traditional and widespread use in philosophy, one can hardly deny that it is not a theory in the sense of a specific scientific theory. Currently, there is no universally accepted theory of knowledge among philosophers. In view of this, it is somewhat unusual to analyze specific theories in terms of a Proteus-like 'theory of knowledge'.

Each analyzed author also refers to their set of 'theories' to underpin their analysis of particular scientific theories. Examples include the genuine philosophical theory, the inductive theory of science, the logico-subjective theory and the theory of the propensities (Popper); the theory of scientific inquiry, the paradigm theory, the theory of perception and of the mind, the political theory, and the value theory (Kuhn); the theory of rationality, the theory of imperialism, Marxian theory, the general theory of criticism, the psychological theory, the theory of rationality, the theory of criticism, the phenomenological theory, the pragmatic theory of truth, the simplicity theory, the metaphysical-logical theory, the rational theory of practical action, the theory of scientific research programs, and the phenomenal theory (Lakatos); the theory of rationality, the theory of science, the counter-factual theory, the theory of meaning, the theory of test, the value theory, confirmation theory, and the economic theory (Feyerabend). We also observed that in their publications, these authors did not systematically distinguish between the concepts of science and scientific theories. However, there have been and still are sciences without mature scientific theories, but there are no actual scientific theories outside any particular science.

Thus, it appears at least strange that when trying to provide a proper analysis of a specific scientific theory, recognized experts in modern philosophy of science, firstly, do not isolate its components, and secondly, use the term 'theory' to refer to entities that are not actually theories. Would one trust the detailed and eloquent discussions by engineers analyzing cars, their design, construction, functions, repairs, advantages, and disadvantages, if they did not separate car components and their interrelationships?

In contrast to the chosen famous authors, some philosophers offer a more detailed vision of the componential structure of scientific theories. One of those is Mario Bunge, who, to our knowledge, provides the most detailed list of the theory's components.

In one of his works, Bunge identified large components—indeed, complex parts of theories—without delving into their internal composition. He wrote: "[A] physical theory is a mathematical formalism endowed with a physical meaning and therefore susceptible to empirical tests, eventually with the assistance of further theories. The formalism is a hypothetico-deductive system, i.e. a set of formulas generated by applying logic and mathematics to a set of initial assumptions. These basic hypotheses or axioms are given some physical meaning by interpreting the basic symbols of the theory in physical terms, i.e. by adding interpretation postulates that make those symbols stand for definite physical things and properties thereof. The same formalism can be attached several interpretations, a process whereby several physical theories can emerge" (Bunge, 1967: p. 26).

In another book, Bunge significantly concretized this vision in terms of his general understanding of theories: "A peculiarity of 20th-century science is that the most important scientific activity, the deepest and most fertile is centered around theories rather than around stray questions, data, classifications, or stray conjectures. Problems are posed, and data are gathered in the light of theories and with the hope of conceiving new hypotheses that may in turn be expanded or synthesized into theories; observations, measurements and experiments are executed not only to collect information and generate hypotheses but also to test theories and find their domain of truth; and action itself, to the extent to which it is deliberate, relies more and more on theories or better or for worse. In short, an emphasis on system on empirically testable theory, of course rather than on raw experience is what characterizes contemporary science" (Bunge, 2017: p. 433).

Two intertwined, truly entangled questions arise. Namely, which components does a theory consist of, and what characteristic property of a theory unites these components to ensure the implementation of its functions, as formulated by Bunge?

At first glance, the answer to the second question seems obvious and unique. Unfortunately, it is not so. Indeed, there is no doubt that a theory must be a system of its components. However, to consider a theory as a system, it is additionally necessary to establish the relationships between its components. The character of the components included determines the relationships between them and, consequently, the specifics of the theory's systemic nature. Thus, the answers to the second question depend on the answers to the first question. The variants of the latter answers are abundant.

Let us consider Bunge's answers to the first question.

On page 387, he asserts that "theories are not models but involve models" and defines a model as "an idealized representation of a class of real objects".

On page 391, he states that "a scientific theory is a system of hypotheses that is supposed to give a partial and approximate account of a bit of reality".

On page 406, Bunge writes that "[f]rom a logical point of view, ..., a theory, whether scientific or not, can be characterized by the following definition: A theory is a set of formulas of the predicate calculus (with identity) closed under deduction in this calculus, and include in it" (Bunge, 1967).

Using his terminology, he proposed, in addition to a logical view, at least a hypothetical and a model view of the theory. These views are not arbitrary but grounded in the theory's identified components.

As a rule, a certain component does not enter a theory alone. For example, according to the logical view of any theory, there are at least two rules of inference: *modus ponens* and *modus tollens*. According to the hypothetical view on celestial mechanics, there are assumptions about absoluteness, unchangeability, isotropy, and three-dimensionality of space, the independence of space and time, and long-range action at a distance, among others. According to the model view of this theory, it contains models of planets as material points, solid bodies, and ideal spheres, among others. These instances, firstly, provide grounds for considering not a single component but a set of components of the same kind, and, secondly, allow us to single out the theory's subsystems that consist of identical kinds of sets of components.

Thus, Bunge factually operates with different kinds of systematicity in a theory: logical, hypothetical, model, etc. The components of each system have specific interconnections that cannot be reduced to the relations between components of a logical system.

The polysystemic view of theories, on the one hand, rearranges and refines the components and subsystems of scientific theories that Bunge really identified, and, on the other hand, introduces components and subsystems to which he did not pay due attention. An example of the first feature is the introduction of an operational subsystem, which includes not only operations of logical deduction of some statements from others but also those for solving problems as components of the theory. An example of the second characteristic is the introduction of an approximation subsystem. Its components are associated not only with models but also with problem-solving operations. Any problem with the actual specific theory does not have an exact solution.

It appears that only one philosophical approach has attempted to elucidate various components of theories in detail, including models and related elements. According to J. D. Sneed, "theory [of mathematical physics. — *A.G., V.K.*] is identified as an ordered pair consisting of its characteristic mathematical structure — including 'essential' constraints on its theoretical functions — and its characteristic range of intended applications" (Sneed, 1971: p. X) where "mathematical structure" is "the core of the theory" (Ibid.: p. 2). In turn, a core consists of a set of partial possible models, a set of possible models, a set of laws, a set of constraints and a function connecting the first two sets (Ibid.: p. 171). See the framework, development, numerous applications and defence of this so-called new structuralism in (Balzer, Moulines, Sneed, 1987; Balzer, Sneed, 1989; Balzer, Moulines, 1996; Díez, Moulines, 1999; Balzer, Moulines, Sneed, 2000; Moulines, 2002; Lorenzano, 2010).

The authors of one of the popular handbooks devoted to the philosophy of physics (Batterman, 2013) gave valuable considerations of specific physical theories. Still, none of the contributors presented at least a paragraph about the concept of a theory and its composition. The same is true for another handbook (Butterfield, Earman, Gabbay, Thagard, 2006) and the handbook of the history of physics (Buchwald, Fox, 2014). However, on the pages of the last handbook, real or alleged scientific revolutions (in the spirit of Kuhn) are predominantly described, rather than theories.

The content of the last two handbooks suggests that physicists are using revolutions rather than theories in their attempts to study nature. Placing revolutions at the center of the study of physics has undoubtedly created a tremendous space for lively conversations about physics among philosophers and sociologists, who recall their Marxist tutors whenever they encounter any revolutionary agenda. The "revolutionary" terminology also has a great impact on the style and content of studies in social sciences and humanities. However, the "revolutionary" topic has not found support among working physicists. The reason is that it does not reflect the main motives and tools of their activities. The essence of theoretical physicists' cognitive activity is to construct a theory, demonstrate its connections with other theories, and, if necessary, modify its components, thereby altering their interdependence.

Revolutions might signify only extended periods of relative uncertainty (conceptual anomy) induced by transitions from earlier accepted theories to new theories grounded in ideas that sometimes contradict previous ones. However, is it a revolution or a gradual evolution? For instance, crucial notions of *entanglement* and *decoherence* in quantum mechanics emerged at the dawn of this theoretical framework and remain under discussion and clarification (Baggott, Heilbron, 2024; Schlosshauer, 2008). In most thought-provoking cases, new experimental possibilities and, as outcomes, the emergence of new physical realms and attempts to study them within the framework of old theories induce these transitions. It is a rather typical situation in our constantly modernized society. For instance, pilots must relearn and train for every new type of aircraft.

It would be strange to derive significant philosophical problems from this triviality, which highlights the psychology of pilots and overlooks innovative aircraft designs and their connections. Regardless of age and qualification, modern physicists are educated to be ready, under the flow of experimental data, to abandon one theory in favor of a deeper, more effective, and productive one. The corresponding processes take some time and create numerous psychological difficulties. Nevertheless, physicists participating in truly groundbreaking processes do not perceive their professional activity as revolutionary acts. The terms "revolution" (Dowling, 2003; Healey, 2017; Peacock, 2007) and "the change of paradigm" (Kuhn, 1962) appear retrospectively and do not accurately capture the essence and continuity of scientific progress within the frameworks of abstract and specific theories.

A mathematician, Frank Ramsey, proposed a widely accepted logical narrative view of the composition of a theory. He described "a theory simply as a language for discussing the facts that the theory is said to explain" (Ramsey, 1931: p. 212). Considering the textual exposition of a theory, he and his adherents reduce it to a set of statements that can be studied using logical tools. Unfortunately, neither he nor his followers analyzed genuine physical theories, at least with regard to some of their components, such as models and/or problems.

M. Curd and J. Cover attempted to summarize the philosophical discussions on scientific theories (see: Curd, Cover, 1998). Opinions on theories "differ as to what a scientific theory is and how it should be analyzed. The traditional view, and still the view of most philosophers of science in the twentieth century, is that a theory is a set of statements or propositions. For example, Newton's theory of gravity consists of a statement of Newton's law of gravitational attraction together with a few other statements essential to Newton's theory. A newer view, the semantic view advocated by Bas van Fraassen, Ronald Giere, and others, is that a theory is a definition or a set of models. In any case, to call something a theory is not to denigrate it or to imply any unfavorable contrast with facts. A theory becomes a fact (or, at least, is believed to be a fact) when it is well confirmed and established" (Ibid.: p. 1310).

The view presented above appears very general, lacking specificity about the types of statements or propositions and their relationships. Statements about what? Which languages are used in their formulation? Are there only logical relations between statements? Is solving a problem or constructing a model a purely logical process? The semantic view (Suppe, 1998; Winther, 2020; see also: Manero, 2024) requires specification because studying practical theories reveals a variety of models (Balzer, Moulines, Sneed, 1987). Moreover, as the above list of visions on theory's composition shows, many authors suppose that theories also include components other than those mentioned in the previous paragraph. To summarize, although philosophers of physics have been discussing theories for many decades, their efforts have had no observable influence on the work of physicists or on their publications.

Conclusions

> In the end, you can't do physics without metaphysics.
>
> *E. Cavalcanti*

> Philosophy of science is as useful to scientists as ornithology is to birds.
>
> *Attributed to R. Feynman*

> Physicists do of course carry around with them a working philosophy. For most of us, it is a rough-and-ready realism, a belief in the objective reality of the ingredients of our scientific theories. But this has been learned through the experience of scientific research and rarely from the teachings of philosophers.
>
> I know of *no one* who has participated actively in the advance of physics in the postwar period whose research has been significantly helped by the work of philosophers. I raised … the problem of what Wigner calls the 'unreasonable effectiveness' of mathematics; here I want to take up another equally puzzling phenomenon, the unreasonable ineffectiveness of philosophy.
>
> *S. Weinberg*

Let us return to our comparisons of cars and theories. It is a truism that designing, constructing, and professional driving a car are effective only when manufacturers and drivers know the necessary car components and their complex internal arrangements, functions, and interconnections.

There is no doubt that for scientists, a theory is a fundamental and essential intellectual tool. That is why one can hope that a detailed and comprehensive description of it and its components will be valuable in scientists' ongoing efforts to gain new knowledge about realities within a specific theory. Knowing the components of a theory and their interdependent connections is also crucial for its creation, development, and successful application. However, for many professional scientists and philosophers of science, this truth appears insignificant and unhelpful. As this article suggests, such skepticism is based on flawed views of theories.

This uncertain situation, epistemologically interesting to both scientists and philosophers, poses an old, quite general question: What is the role of philosophers in scientific cognitive activity? To our mind, one of the principal tasks of the philosophy of science is to elaborate an adequate description of the attributes and functions of scientific theories and their connection. The obligatory requirement for its solution is that theory analysts possess a certain level of competence in scientific theories, acquired through university education and collaboration with professional scientists. Theories are scientific instruments, and to discuss them, one should possess his/her own professional scientific and philosophical views. The higher the level of these views is, the deeper and more profound are the scientific and philosophical understandings of theories, and the better is the resolution of the views concerned.

There is a clear analogy in cosmology, where higher-resolution observational tools yield new and unexpected results. “The simulations that were run on the largest cosmic scales were only at medium resolution, not at very high resolution, which meant that a certain class of region was omitted: the regions that began with the highest initial densities on the smallest of cosmic scales, or what they called ‘rarepeak’ regions.” (Siegel, 2025). A vast body of evidence now supports the modified, groundbreaking theories that emerged in cosmology. In the same manner, viewing the theory at higher resolution reveals many previously hidden peculiarities and attributes.

In light of the polysystemic reconstruction of scientific theory, each of the mentioned views focuses attention only on some of the inherent types of theory components and identifies the theory’s compositional content with the set of selected components. The absence of certain components means that one is not able to consider the entire spectrum of relationships between both similar and different components of a specific theory. Moreover, even the components presented in one of the mentioned particular points of view on theory are, in most cases, treated as unchangeable. This approach complicates the consideration of the development and dynamics of the chosen theory, as well as its relationships with other theories.

One indicator that some sciences are at a pre-theoretical stage of development (Gabovich, Kuznetsov, 2019) is the systems of views that philosophers of these sciences regard as theories. For example, J. Reiss and R.A. Ankeny (Reiss, Ankeny, 2016) believe that analyzing medicine and its philosophy requires only focusing on the narrow and broad senses of theory. “In the narrower sense, a theory comprises a set of symbols and concepts used to represent the entities in a domain of discourse, as well as a set of simple, general-purpose principles that describe the behavior of these entities in abstract terms. In the broader sense, theory refers to any statement or set of statements used to explain the phenomena of a given domain”. In this article, the term “theory” does not refer to any specific medical theory but rather to opinions that their authors name as a theory to elevate the epistemological status of their thoughts. Of course, we do not deny the existence of specific medical theories, but analyzing them in a polysystemic way is not the focus of our article. However, the cited aspects of theories have a very distant and unspecified relation to genuine scientific theory. They are merely vague and non-heuristic collections of unconnected elements.

Theory’s development actualizes the so-called hidden components connected with the modifications of its components. Indeed, the view of a theory as a static construction comprises only operations with its available components (for instance, as at the beginning of celestial mechanics, dynamic equations of planets included only the Solar gravitational influence). At the same time, the true dynamic view also requires operations to modify these equations: constructing equations that include interactions between each planet and other spatial objects (other planets, asteroids, etc.).

A scientific theory is generally much more complex than its simplified and self-evident views suggest. Returning to Bunge's opinion about the importance of an adequate view of theories, we would like to add that implementing a polysystemic view of theories can bring philosophers of science, historians of science, and teachers closer to the practice of real science.

Let us compare cars and theories once more. A car represents an example of a complex artificial polysystem when considering potential options for its systematic modernization. In the case of a car, the actions of designers, manufacturers, repair mechanics, and drivers are confined to interactions with its subsystems. Many of these subsystems already exist in the earliest cars. Since then, new car subsystems have primarily focused on enhancing existing ones, making their management easier, and monitoring their performance. In the future, entirely new subsystems that we have not yet imagined could be created. AI-driven cars were unthinkable twenty years ago. Nonetheless, such subsystems are likely to be integrated into the car as a polysystem, and their development will not eliminate the existing subsystems.

Anyway, scientists involved in their polysystemic theories should carry out the following tasks: (1) the practical application of an existing scientific specific theory to solve problems related to the description and explanation of new experimental data; (2) its conservative improvement, and (3) its innovative or radical development. In this case, similar to the automobile industry, the range of actions is performed within the subsystems of the polysystem they use. The specificity of these polysystems is, in a sense, irrelevant.

What is the importance of the suggested complete component composition of scientific theories for metasciences about science? We refer to the philosophy of science, the history of science, and the teaching and education of science. The lack of adequate ideas about the components of theories makes at least the philosophers' attempts to propose solutions to different scientific problems questionable. Car mechanics are in a more favorable position because they have detailed descriptions of cars, understand and work with car subsystems and their deficiencies, and can offer car designers ideas for improving them. Unfortunately, this is not true for philosophers of science. Gaps in historians of science's notions regarding theories limit their views on the development of science.

All parts of the theory are interconnected and interact within a highly complex multivariate and asynchronous process. For instance, it is risky for historians of science to overlook the significance of certain elements of the theory, such as names and approximations, in its development.

Teaching scientific disciplines becomes more effective when students, from the very beginning, grasp adequate ideas about the real components of the theories they study, viewing them as complex polysystems (Chandrasekhar, 1995; Duschl, 1990). The names of these components act as legends on the theoretical map, helping to orient both students and experienced researchers in the scientific landscape and its further exploration and explanation. Regardless of the specific science, its map of theory must necessarily include legends (symbols) representing languages, models, problems, operations, assessments, and other components of that science.

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З ЯКИХ КОМПОНЕНТІВ ПОБУДОВАНА КОНКРЕТНА НАУКОВА ТЕОРІЯ? (Частина 2)

Під конкретними теоріями розуміють наукові теорії, за допомоги яких досліджують певні типи матеріальних реалій або явищ (елементарні частинки, плазма, надпровідні матеріали, квантове тунелювання, хімічні реакції, регуляція генів, рух тектонічних плит, Всесвіт). Після розгляду запропонованих вченими та філософами науки різних компонентних поділів теорії, з'ясовано, що вони беруть до уваги лише деякі суттєві компоненти та навіть поминають багато їхніх важливих рис. Неповні та недиференційовані бачення складу теорій, з одного боку, не враховують багато критичних ознак конкретної теорії, включно з її розвитком та зв'язками з іншими теоріями. З іншого боку, вони часто породжують псевдопроблеми, прикладом яких є популярна теза про несумірність класичних та квантових теорій. Оскільки теорії лежать в основі сучасних наук, їхні редуковані бачення призводять до надмірно спрощеного та занадто загального розуміння науки та її прогресу. Стаття розкриває значення та корисність полісистемного аналізу конкретних теорій та їхнього розвитку для історії, філософії, соціології та педагогіки науки. У першій частині статті описано складники теорій та погляди на них фізиків. У другій частині буде розглянуто погляди філософів на теорії та викладено висновки.

Ключові слова: *конкретні теорії; складність; типи компонентів; полісистемний погляд; підсистеми.*