

KNOWLEDGE OF NATURE BY LEARNING THEORY AND EXPERIMENT

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ABSTRACT

Cognition of the surrounding world is the characteristic of all living beings, including a person who has learned to effectively acquire new knowledge, use it in his life and accumulate it for transmission to subsequent generations. In this article, I shall discuss about knowledge of nature by learning theory and experiment as well.

Keywords: Knowledge, cognition, theory, experiment.

INTRODUCTION

As we study a phenomenon, a person reveals his/her properties and connections with other phenomena more and more. This process of cognition is called the comprehension of the truth. Truth is a true reflection of the properties of the objects or phenomena being studied, which do not depend either on a particular person or on all of humanity. Truth is always relative. However, it contains a piece of such knowledge that cannot be rejected by the further development of knowledge - knowledge of the absolute. Each subsequent step in knowledge adds new seeds to this amount of absolute truth.

Materials and Methods

Based on the goals of cognition, we can formulate a criterion for the truth of our knowledge. It is determined by practice, i.e. how successfully humanity can use them. It is true that it is directly or indirectly confirmed by the practical activity of man. At the present time, scientific cognition takes the leading role in the process of cognition. Science is engaged in the development and theoretical systematization of objective, i.e. knowledge about reality that does not depend on a particular researcher.

The scheme of scientific knowledge can be depicted as follows below. *See the Figure 1.* Cognition is based on sensory perception - observation carried out with the help of the senses or special instruments.

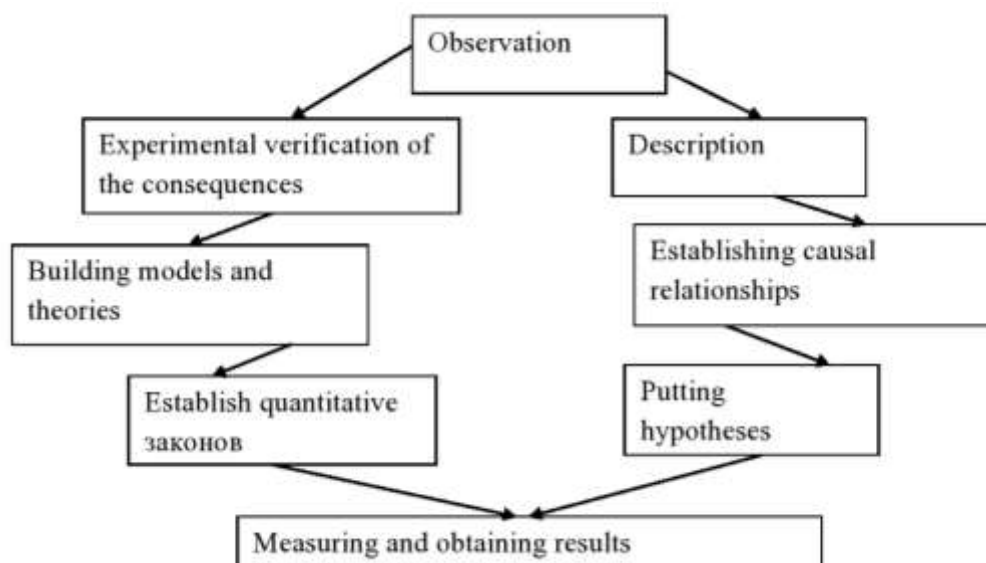


Figure: 1.

The scientific method of cognition requires the generalization of information obtained in the process of observing any phenomena, critical understanding and their comparison with previous observations. The scientific interpretation of observation results requires a theoretical description using a system of abstract concepts. Certain rules for working with these concepts are established - the rules of logic. If, in the process of studying a sufficiently wide range of phenomena between them, stable repeating connections are found, including in the form of numerical ratios between the measured quantities, then they are formulated in the form of laws. Gradually expanding the scientific description of the considered range of phenomena, including all new objects, science comes to the creation of a scientific theory, i.e. to a system of models, as well as concepts and laws that allow consistently and consistently describe a wide range of phenomena.

Further theoretical construction based on laws and models based on formal logic leads to conclusions that can be verified in specially designed experiments or more careful observations. The coincidence of the results of observations with the hypotheses put forward about the course of new experiments and the confirmation of the predictions of theoretical generalization, leads to the formation of theories, which in the future can serve as independent criteria for the truth of logical constructions or the foundations for setting and understanding new experiments.

RESULTS AND DISCUSSIONS

As a result of repeated reproduction of any observation, a life experience increases and combines the information received and the person's reaction to them. This experience can be recorded and passed on from generation to generation.

Thus, experiment underlies physical theories and at the same time serves to test and refine them. The theory, on the one hand, generalizes the results of experiments and observations, and, on the other hand, predicts new, as yet unknown phenomena, serves as the basis for setting up new experiments and observations. The criterion for the correctness of any scientific theory is the practical activity of all mankind, using its conclusions.

One of the most important features of physics, which distinguishes it from other sciences, is the use of a special tool of cognition called experiment (from the Latin *experimentum* - a visual argument, evidence based on experience). Experiment is a method of cognition by means of which all phenomena of reality are investigated under controlled conditions.

Physicists see a phenomenon (from observations or experiments) and try to explain them. The theory of the phenomenon existing by that time does not allow giving an unambiguous answer. A hypothesis is put forward that explains these facts. But for science, this knowledge is not established until the experimenters verify it in their experiments. This was the case with the atom model, for example. Thompson hypothesized that the atom was a homogeneous positively charged mass interspersed with electrons. Rutherford set up an experiment that refuted this hypothesis and put forward another, planetary model, which soon became a theory, that is, a generally accepted law confirmed by experiment. Without practice, without experiment, there is no science. Marx expressed this very briefly and succinctly:

Practice is the criterion of truth

The experiment is carried out on the basis of a theory that determines the formulation of the problem and the interpretation of the results. In contrast to observation, in an experiment, the object under study is actively influenced, which significantly increases the possibility of its investigation. It is a practical test of nature and its properties.

The main requirements for a scientific experiment are objectivity, i.e. observer independence, and reproducibility. Repetition of the experiment in another place, at another time, with different physical objects and measuring instruments with the same values of the physical quantities that set the experimental situation, should give the same values for the characteristics of the phenomenon. It is the reproducibility of the experiment that provides sufficient reliability of the description of the phenomenon.

At present, experiment plays the main role as a source of information about physical phenomena.

Physics uses various types of experiment: full-scale (real falling of real nuclei from the Leaning Tower of Pisa), model (study of water resistance to the movement of ships on their reduced models), mental (Galileo's reasoning about observing movement in the cabin of a sailing ship), computer (modeling the behavior of a gas consisting of from a large number of elastic balls).

CONCLUSION

The process of cognition of nature is inevitably accompanied by a change in the conditions in which a person exists. All the great achievements of modern technical civilization appeared as a consequence (often indirect) of the search for an answer to the question: how does the world work? In modern conditions, a significant part of physicists are working on applied problems of using already open laws, on the problems of rational use of existing achievements and on the problems of eliminating the consequences of the global impact of the achievements of civilization on the human body and its habitat.

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