ISSN: 2837-4509
Iris Online Journal of Arts and Social Sciences
DOI: 10.33552/IOJASS.2024.01.000525
Iris Publishers

Research Article

Why-Problems Based on Coordination Theory

Yundong Zhu*

University of Chinese Academy of Sciences, China

Corresponding author: Yundong Zhu, University of Chinese Academy of Sciences, China

Received Date: December 29, 2023

Published Date: January 09, 2024

Abstract

Coordination theory holds that the overall goal of science is to resolve conflicts and pursue coordination. Coordination force is the effectiveness of theoretical problem-solving that has hierarchical and calculable. Based on the coordination theory, the coordination force of a theory can be calculated through comparison of the problemors and solutionors of the theory from three levels: empirical, conceptual, and background, and what is more the scientific research results can be intuitively evaluated and selected. According to the coordination theory, the why-problem is divided into three levels: empirical why-problem, conceptual why-problem and background why-problem, and there are different requirements for the solutions to the why-problems at different levels. Fundamentally, the solution of why-problem should have a certain degree of coordination force.

Keywords: Coordination force, Why-problems, Problemor, Solutionor

Introduction

Coordination theory is a rational model of new scientific progress designed by Professor Lei Ma on the basis of Laudan's problem-solving model. The new model critically absorbs the the advantages of logicism, historicism, and problem-solving theories, providing a more open theory. It argues that "the overall goal of science is to resolve conflicts and pursue coordination", [1] and take coordination force (the effectiveness of theory to solve problems) as the measure of scientific progress. This theory believes that scientific rationality is due to the fact that theory has a certain degree of coordination force, and scientific progress is due to the continuous growth of coordination force of theory. This paper analyzes the why-problems and its solution based on the coordination theory.

Three levels of why-problems

Coordination theory analyzes scientific problems from three levels: empirical problems, conceptual problems, and background problems. All three levels of problems are indispensable in the process of theoretical construction. According to the Coordination theory, the why-problem can be divided into three levels: empirical why-problems, conceptual why-problems, and background why-problems.

Coordination theory regards a problem as a combination of problemors and the form of posing problems. Furthermore, different problems are due to different combinations of problemors and problemors. Coordination theory defines a problemor as "something that we are curious about, eager to understand, and poses problems about." [1] A problemor can be observations of facts, static conceptual forms such as definitions, assumptions, laws, principles, rules, methods, etc., or characteristics manifested by the combination of theory and practice. The form of posing problems can be asked such as "whether", "what", "why", "how?" and all. [1] When we do not limit the form of posing problems, but on just alter the problemor, we can get the corresponding level of problems. Therefore, when we confine the form of posing problems to "why", we can define the three levels of why-problems.

Empirical why-problems

A empirical why-problem is raised in a "why" form regarding one or some empirical facts and test implications, which can be divided into observational why-problems and confirmatory why-problems according to the differences in empirical problems.

(a) Observational why-problem. The "apple falls" in the question "Why an apple falls toward the earth?" is an empirical fact.

(b) Confirmatory why-problems. The problem comes from the theory which is the testing implications of the theory and can be tested by observational experiments in principle. For instance, why does Uranus's trajectory not quite match reality?

Conceptual why-problems

A conceptual why-problem asks an empirical or conceptual solutionor in a "why" form. [1] The conceptual why-problem presents different levels due to the difference in the conceptual problemor. When the problemor is an empirical solutionor, the lowest level of conceptual why-problem is formed, and when the problemor is a conceptual solutionor, a higher-level conceptual why-problem is formed.

Background why-problems

A background why-problem asks the relationship between the intrinsic and extrinsic strategies of the theory in a "why" form. [1] The intrinsic strategy here refers to the static conceptual form we mentioned above, which constitutes the internal reason for judging the theory, and the external strategy refers to the dynamic non-conceptual form such as observation, experimental process, functional release of technical objects, confirmation of the scientific community, and policy support. The relationship between intrinsic and extrinsic strategies is a dynamic and multi-dimensional consideration of scientific research. In the history of science, sometimes an experiment supports two contradictory theories at the same time. Why does this happen? We can neither reduce it to an empirical why-problem, nor can we reduce it to a conceptual why-problems. People have various understandings and acceptances of a theory, and there will be different understandings based on different theories.

The Solutions of why-problems

Like the division of problems, the coordination theory divides the solution of problems into three levels: empirical, conceptual, and background. An empirical solution is an answer to an empirical problem, a conceptual solution is an answer to a conceptual problem, and a background solutionor is an answer to a conceptual problem. According to the coordination theory, we make the following analysis of the answer to the why- problems.

The solutions requirements of why-problems at different level

We can refer to explanatory theories to analyze the the solutions of empirical why-problems. Compared to explanatory theories, the solution of why-problem has a peculiarity. Firstly, a distinction should be made between conceptual why-problems and background why-problems. Nagel [2] once divided the explanatory terms involved in the why-problem into truth, individual events, historical events, statistically described historical phenomena, universal theorems, etc., and the truth and universal laws in this should not be included in the empirical level of the why-problem. Skow [3] believes that we should distinguish the reasons why an event occurred ("first-level reasons") from the reasons why those reasons are reasons ("second-level reasons"), and the reasons why an event occurred are its causes.

In this theory, the why problem only involves specific events, corresponding to the observational empirical problem referred to in the coordination theory. In addition to this, Skow holds that laws are second-level reasons which cannot be part of the solution. According to the coordination theory, this view is also reasonable. According to the theory of coordination, Snow's theory is enlightening and reasonable. Since the answer to an empirical problem constitutes an empirical solutionor, it can constitute a conceptual problem, while an empirical phenomenon can only constitute an empirical problem. We cannot just explain phenomena by using phenomena, there must be laws in them.

Solving background why-problems are different from solving empirical why-problem and conceptual why-problem, and it is not directly related to our observation, it belongs to the internal problem of the theory. The profundity of the theory is demonstrated from the empirical why-problems to the conceptual why-problems. For example, in Laudan's [4] view, conceptual problems are those in which the concepts are unclear, inconsistent or contradictory in the theory, and the answer to such problems requires conceptual clarification.

To solve background why-problems are more complex than empirical why-problems and conceptual why-problems. Empirical and conceptual problems are analyzed from the internal of scientific research, while background problems are studied not only from the internal perspective but also from the external perspective. The solve to background why-problems should also demand the psychological acceptance of the subject, the identification of the scientific community, and the experimental process of science.

Solutions of why-problem should show certain coordination

Coordination force are the goal pursued by solving why-problem, and it is the criterion for judging the solve to the why-problem. The coordination theory comprehensively examines the evaluation criteria of theories, among which the evaluation criteria of empirical problems include empirical newness, empirical mightiness, empirical clarity, empirical identity, empirical accuracy, empirical harmony, empirical diversity, empirical succinctness, empirical unity and empirical fixity. The evaluation criteria of conceptual problems include conceptual newness, conceptual mightiness, conceptual clarity, conceptual identity, conceptual harmony, conceptual diversity, conceptual succinctness, conceptual continuity, conceptual unity and conceptual fixity. The evaluation criteria for background problems include background experiment, background technology, background thinking, background psychology, background action, and so on. (Lei Ma, 2014) These evaluation criteria are the indicators of coordination force of theory. The solutions of why-problem must reach at least one of the requirements of coordination. The following is illustrated by examples of accuracy and newness.

Accuracy. Coordination theory holds that the solve to the why-problem does not require an absolutely precise solution, but the solution of why-problem is comparable, and that a theory provides a more precise solution also means that the theory is better, or more precise. Coordination theory regards the development and replacement of theories as the consequences of the pursuit of higher and higher synthetic coordination force.

The solve to the why-problem allows for a certain error, but the range of error is not arbitrary, it means that "it is jointly recognized by scientists of a certain period according to the theoretical, technical and practical conditions of the time." [1] For example, in the history of mathematics, [5] for the determination of the value of π, the modern pi can be accurate to 31.4 trillion decimal places, However, Chinese records indicate that the initial π is taken to be 3. In order to obtain more accurate numerical value the Chinese developed numerous formulas for calculating the areas and volumes of geometrical figures. In 263 AD, Hui Liu used the "circle cutting technique" to first inscribed a regular hexagon on a circle, and subsequently gradually divided it into inscribed regular 192 sides, calculated equivalent to a value for π of 3.141024, and Chongzhi Zu had given a better approximation to π was 3.1415926 in 480 AD. It can be seen that the need for precision in solution promotes the development of science.

Novelty. The solution of why-problem is the process of searching for causality. Causality reflects the inevitable relationship between events, i.e., if event A occurs, event B must occur. If a theory correctly reflects the reason that A is B, and this reason is unexpected, then the theory has a high degree of empirical novelty coordination force. We can verify causality by prediction, and we can test whether a cause we are looking for is true through newness. Einstein believed that light could be bent, and when we observe the bending of light, the novelty of Einstein's theory rises [1].

Empirical novelty is one of the criteria for determining causality, but it is not an absolute criterion. Firstly, not all events are repetitive, or the cycle of repetition is too long or too short for us to test the theory by falsification. Secondly, sometimes an event occurs due to multiple causes, and the cause we find is only one of the necessary conditions, but not sufficient. Thirdly, sometimes we cannot rule out unrelated factors, and sometimes we take one of the effects of the same cause as the cause. If event A occurs, events B and C also occurs; event B precedes event C. But we cannot prove that event B is the cause of event C.

Conclusion

The evaluation of the why-problem and its solution should be judged not only by partial coordination force, but also by synthetic coordination force. There may be a relationship between theories that contain and are included. For example, the empirical problems answered by Galileo's theory can be explained by Newton's theory of mechanics, which shows that synthetic coordination force of Newton's theory exceeds Galileo's theory. There may be opposite theories, such as Huygens's wave theory of light and Newton's particle theory of light, and the evaluation of these two theories will also change at different times, as the partial coordination force and synthetic coordination force of these two theories are also changing. Global warming has become a global concern, though there are multiple explanations for the causes of global warming, widely accepted explanation now is the emission of carbon dioxide. It is precisely since this explanation has a higher synthetic coordination force.

Acknowledgement

None.

Conflict of Interest

No conflict of interest.

References

1. Lei Ma (2008) Conflict and Coordination: A New Theory of Scientific Rationality. Commercial Press.
2. Ernest Nagel (1961) The Structure of Science: Problems in the Logic of Scientific Explanation. Harcourt, Brace & World.
3. Bradford Skow (2017) Levels of Reasons and Causal Explanation. Philosophy of Science 8(5): 905-915.
4. Larry Laudan (1977) Progress and Its Problems. Berkeley: University of California Press.
5. Victor J Katz (2009) A History of Mathematics: An Introduction (3rd edn). Addison Wesley.
6. Lei Ma (2014) Empirical Identity as an Indicator of Theory Choice. Open Journal of Philosophy 4: 584-591.