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Research Article

Analysis and Reform of Leibniz's Law of Sufficient Reason

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Abstract

Since Leibniz first put forward the sufficient reason law in his philosophical work "The Monadology" (1914), the issue of the law of sufficient reason has aroused heated discussions in the field of logic in our country. The question of whether the law of sufficient reason is the basic law of formal logic was particularly heated in the domestic logic circle in 1978-1980. Since then, there has been little discussion, but from the newly compiled formal logic textbooks published one after another, no consensus has been reached. Although they didn't agree on the question of "whether or not", the two sides elaborated their arguments in detail and put forward some new opinions, thus creating new conditions for solving this problem scientifically. Firstly, this paper analyzes the different viewpoints of both sides of the argument. Secondly, it analyzes whether the law of sufficient reason is the basic law of formal logic from whether Leibniz put forward the law of sufficient reason. Finally, on this basis, a new transformation method is put forward. After this transformation, the law of sufficient reason is an important basic law of deductive logic, which can be juxtaposed with the other three logical laws, such as identity, and coordinated with the "three laws" and complement each other.

Keywords

The Sufficient Reason Law, Formal Logic, Reasoning, Principle

1. Introduction

Since Leibniz first put forward the sufficient reason law in his philosophical work "*The Monadology*" (1914) [1], the issue of the sufficient reason law has aroused heated discussions in the field of logic in our country. From 1950s to 1960s, the discussion focused on the authenticity and correctness of reasoning. After the first national logic seminar in 1978, the discussion focused on whether the law of sufficient reason is the basic law of formal logic. On this issue, there are two sides in the debate: one side says yes. Therefore, they are called "affirmationists"; The other side said no. They are called "deniers". Since then, there have been few discussions, but from the newly published formal logic textbooks, no consensus has been reached. On the discussion of the law of sufficient reason, the two sides with different opinions started from Leibniz, based on his exposition in "*The Monadology*". Although they didn't agree on the question of "whether or not", the two sides elaborated their arguments in detail and put forward some new opinions, thus creating new conditions for solving this problem scientifically [2]. Firstly, this paper will analyze whether the law of sufficient reason is the basic law of formal logic from whether Leibniz put forward the law of sufficient reason.

2. The View of the Affirmative

From the perspective of historical development: the origi-

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nal material that the sufficient reason law of formal logic was first explicitly put forward in the form of words is the two reasoning principles put forward by Leibniz in Monologue Theory: "Our reasoning is based on two major principles: (1) the principle of contradiction. With this principle, we judge that those who contain contradictions are false, and those who are opposite or contradictory to false are true. (2) The principle of sufficient reason. Based on this principle, we believe that if anything is true or real, and if any statement is true, there must be a sufficient reason why it is this way but not that way, although these reasons are always unknown to us" [3] (p. 271). The so-called law refers to the general form of the universal connection and mutual restriction of various phenomena in the objective world [4]. Lenin said that law is relationship. The relationship between nature and nature. It is something consolidated in the phenomenon, and it is the same thing in the phenomenon. Besides, the concept of law is a stage of people's understanding of the unity, connection, interdependence and integrity of the world process [5]. Leibniz's sufficient reason contains two aspects: facts and statements, which not only reflects the logical connection of the thinking process, but also embodies the duality of the organic connection of the real process. This does not conform to the basic characteristics of formal logic. Formal logic is only the knowledge about thinking forms, thinking laws, and thinking methods, and does not study the specific content of thinking. However, Leibniz's formulation of sufficient reason is only the original material of the sufficient reason law, not the sufficient reason law itself. Although they are historically related, they are not the same, and history keeps moving forward. The formal law of sufficient reason absorbs the statement side of Leibniz's principle of sufficient reason, and abandons its fact side [6]. The viewpoint about facts in Leibniz's Sufficient Reason Principle is a philosophical viewpoint, which goes beyond the object scope of formal logic. So what remains after abandoning the viewpoint about facts in Leibniz's Sufficient Reason Principle is the sufficient reason law about statements, but it does not go beyond the object scope of the whole science of formal logic. Therefore, it is the basic law of formal logic to deny the law of sufficient reason by Leibniz's narration of the principle of sufficient reason, which is not sufficient and does not meet the requirements of the law of sufficient reason.

1. From the logical significance of Leibniz's sufficient reason principle, we can see that Leibniz's sufficient reason principle is about reasoning, and reasoning is a logical problem. Moreover, Leibniz put forward the principle of sufficient reason and the principle of contradiction in the form of juxtaposition. The principle of contradiction is the principle of judging the truth of propositions in the reasoning process, which is a logical principle; Sufficient reason is the principle used to determine how a statement is true. Therefore, the principle of sufficient reason is also a logical principle.
2. From the word "also" in Leibniz's discourse, it can be confirmed that Leibniz's sufficient reason first exists in the "truth of reasoning", and then exists in the "truth of fact", that is, the principle of sufficient reason, like the principle of contradiction, exists in both truths. In discussing the principle of sufficient reason, Leibniz distinguishes two kinds of truth: truth of reasoning and truth of fact. The truths of reasoning are necessary, their opposites are impossible. The truths of facts are accidental, their opposites are possible. Leibniz cites mathematics as an example to illustrate the truth of reasoning. Leibniz cites mathematics as an example to illustrate the truth of reasoning, the truth of mathematics is inevitable. This is how mathematicians use analytical methods to reduce speculative theorems and practical laws into definitions, axioms, and postulates. These are primitive truths that do not require proof. Then, Leibniz said: "But sufficient reasons must also exist in accidental truths or truths of facts." "It can be seen that Leibniz's sufficient reason exists successively in "the truth of reasoning" and "the truth of fact", because both truths need to prove the truth of the topic. No matter whether the proposition belongs to the truth of reasoning or the truth of fact, they must have a sufficient reason why it is this way but not that way.
3. Although Hegel criticized Leibniz's principle of sufficient reason, he did not deny that the law of sufficient reason is a logical law. From Hegel's criticism of Leibniz's sufficient reason: First of all, in his Shorter Logic, Hegel said about the category of pure reflection: "Ground, which can also be translated as a reason, is the unity of similarities and differences, and the truth developed from similarities and differences,… The law of reason is like this: everything has its sufficient reason, …Everything has its sufficient reason, … This is the simple meaning of the so-called law of sufficient reason, which claims that things must be regarded as indirect in nature. [3] (p. 268)" Hegel discussed the dialectical progress of identity, difference and basis (reason), and affirmed the basis as the proposition of identity and difference. Hegel's criticism is: "Formal logic sets a bad example for other sciences when it clarifies this ideological law. Because formal logic requires other sciences to tell the basis, and does not take the direct material as the criterion, but it puts forward an ideological law that has not been proved or explained indirectly. [3] (p. 269) (Hegel: Shorter Logic, Joint Publishing Company, 1954, p269) Hegel also criticized the so-called "purely mechanical conceptual method", that is, relying solely on the so-called "formal basis". Hegel said, "It is the position and principle of sophists to seek only the basis of form." Hegel added that when Leibniz talked about the law of sufficient reason, what he wanted to oppose was the purely mechanical conceptual method that was still very popular at that time and loved by many people.[3] (p. 271)

Thus, firstly, Hegel did not fundamentally oppose the law

of sufficient reason put forward by Leibniz, nor did he deny that the law of sufficient reason is the law of formal logic. On the contrary, he affirmed Leibniz's law of sufficient reason, and Hegel only gave this law a new explanation from the perspective of Leibniz's idealist dialectics. Secondly, we can't deny that the law of sufficient reason is the law of logic just because Hegel criticized it. Because Hegel criticized the law of identity, law of contradiction and law of excluded middle more sharply. Therefore, Hegel criticized Leibniz's sufficient reason to try to deny that the law of sufficient reason is a logical law, which in itself is not sufficient. This judgment is just a simple misunderstanding of Hegel's dialectical formulation.

4. From the fact that the truth that Leibniz refers to is not equal to perceptual experience, he does not deny that the law of sufficient reason is a logical law. Leibniz believes that factual truth is the experience formed by the continuity of memory. These experiences are accidental, and they cannot be transformed into necessity. They cannot rise to rationality, so they do not belong to the category of logic. At first glance, this sentence itself can be a reason to deny that the law of sufficient reason is the logical law put forward by Leibniz, but it is not. First of all, Leibniz has clearly distinguished people's perceptual activities from reflective activities before talking about the principle of sufficient reason. However, introspection distinguishes us from animals, it makes us rational and scientific, and it also provides the main object for our reasoning. It is for this reason that Leibniz regards the law of sufficient reason as one of the two principles of reasoning.

Secondly, Leibniz also put forward that accidental things exist, and these accidental things can only get their final or sufficient reasons in the necessary entity. The necessary entity has its own reason for existence. The sufficient reason or the last reason should exist outside the series of accidental things, although this series can be infinite. So the last reason of things should be in an inevitable entity. This entity is a sufficient reason for all the details. That is, sufficient reasons are required to be changed from accidental factors to necessity and to rationality. Leibniz emphasized that the wisest people don't rely on experience so much, but rather try their best to find some reasons.

In addition, the truth of reasoning and the truth of facts put forward by Leibniz are not equal to rational propositions and empirical propositions, and they are no longer perceptual experiences. Leibniz said that this principle of sufficient reason is unnecessary for arithmetic and geometry, but it is necessary for physics and mechanics. We often call mathematics deductive science and physics and mechanics empirical science. Experience is a polysemous word. Experience in empirical science is different from sensory experience and perceptual experience, which are the products of perceptual stage. Leibniz saw the difference between these two kinds of science here. From the point of view that both of them have to prove the truth of propositions, the principle of contradiction (including the law of identity and law of excluded middle) and the principle of sufficient reason play an important role. However, when deductive science temporarily puts aside the specific content of cognition in its system and makes purely formal deduction, the principle of contradiction comes into play. It must keep the identity, non-contradiction and clarity of the deduction form. At this time, the principle of sufficient reason does not work temporarily, because it neither requires the premise to be true nor confirms that the conclusion must be true. However, empirical science can't put aside the specific content of knowledge and make pure form deduction at any time, so the principle of contradiction and the principle of sufficient reason play a role in the whole process of reasoning. In the face of scientific facts, we can't help but admit the truth of facts, which is derived by the principle of sufficient reason. Factual truth cannot be equated with perceptual experience, then the Law of Sufficient Reason that operates on factual truth is beyond the scope of perceptual experience. Thus, asserting that the principle of sufficient reason is not a logical law is inconsistent with Leibniz's original intent.

3. The View of the Denialists

Scholars who deny that the law of sufficient reason is the basic law of formal logic often say that Leibniz's principle of sufficient reason is not the basic law of logic. They often think that Leibniz's principle of sufficient reason is an ontological law rather than a logical law based on the following reasons.

1) It is considered that Leibniz's principle of sufficient reason is a metaphysical axiom, not a logical law. At the end of the 19th century and the beginning of the 20th century, a famous German logician, G. Zigwat (1830-1904), put forward in his Logic that the so-called sufficient reason law was originally thought out by Leibniz. It is by no means a logical law, but a metaphysical axiom, and it only applies to our judgment. Zigwat pointed out that the law of sufficient reason is by no means a logical law. He believes that the law of sufficient reason, as a logical law, is not only poor in content but also ineffective. It is difficult to find logical reasons different from the real reasons of things. Even Leibniz himself made it clear that this reason is often unknown to us. Since we have reasons that we often don't know, and Leibniz's principle of sufficient reasons can't make us find sufficient reasons, then this is not a logical law with universal significance. Moreover, according to the requirement of this law, if people's thoughts must have sufficient reasons, they can't think anything without sufficient reasons, so that our thoughts will be imprisoned and never move forward.
2) Judging from the real intention of Leibniz in putting forward the principle of sufficient reason, he used the

principle of sufficient reason to prove the existence of God a posteriori, rather than to show that the principle of sufficient reason is the basic law of logic. Leibniz was a transcendentalist who split sensibility and reason, absolutely separating logical thinking from factual experience. He said in Monadology that there are also two kinds of truth, the truth of reasoning and the truth of fact. Logic and mathematics belong to the truth of reasoning, and they reach inevitable results through logical deduction and analytical methods. The truth of the facts is only accidental. Even if there are many facts as the basis, the necessary truth cannot be reached through logical deduction, but only by sufficient reasons [7]. Leibniz believes that the truth of fact is the experience formed by the continuity of memory. These experiences are accidental, they can't be transformed into necessity or rise to rationality, so they don't belong to the category of logic.

In addition, when Leibniz talked about the principle of sufficient reason, it showed that if something or a statement is true, it must have sufficient reason. This principle is different from the argument of sufficient reason law mentioned in the logic book, which should be based on facts, and any real judgment needs sufficient reason. Because Leibniz does not admit that perceptual knowledge can leap to rational knowledge, he firmly denies that rational knowledge must be based on perceptual knowledge. He believes that experience cannot be transformed into reason. Truth as a fact is opposite to inevitable truth. The principle of sufficient reason to obtain factual truth cannot be a logical law. Leibniz took the principle of sufficient reason as his philosophical basis and the basis of his idealism and monasticism. He used it to separate nature from nurture, reason from experience, and logic from fact. He put forward the principle of sufficient reason in order to explain that there are two principles for obtaining truth. The deduction of pure concepts based on the contradictory principle of logic can prove the existence of God, which is "the truth of reasoning". He also demonstrated the existence of God from experience on the basis of the principle of sufficient reason, which has nothing to do with logical thinking, by looking for the causes of general facts, and finding sufficient and final reasons among endless reasons. This sufficient reason is God. Leibniz uses the principle of sufficient reason to prove the existence of God a posteriori, which is the essence of his so-called truth of facts, and also the real intention of his principle of sufficient reason.

From Leibniz's explanation of reason or sufficient reason, we can see that the principle of sufficient reason, that is, the law of sufficient reason, was put forward in Leibniz's "The Monadology" in the process of discussing the characteristics of monads. Among them, logic and ontology are mixed together, and the law of sufficient reason is intertwined with the demonstration of the existence of God. The reasons or sufficient reasons mentioned by Leibniz can be summed up as follows:

3) Sufficient reason refers to the reason why something exists or changes. Leibniz said that if anything is true or real... There must be a sufficient reason why it is this way and not that way. There is an element in this creation that can be used to explain the cause of what happened in another creation. We say that creation or pure entity is dynamic because we clearly know that there is a component in it that can explain what happened in the other middle. And it is passive because the cause of what happened in it lies in another component that we know clearly.
4) Sufficient reason can refer to the basis for stating a proposition or truth. Leibniz, for example, believes that if any statement is true, there must be a sufficient reason why it is this way and not that way. Leibniz said, with this principle of sufficient reason, we believe that if anything is true or real, if any statement is true, there must be a sufficient reason why it is this way and not that way, although these reasons are often always unknown to us [8].
5) Sufficient reason refers to God. In Monologue, sufficient reason and final reason are often synonymous with God, and they are often used together. Therefore, for a great variety of accidental things in nature, sufficient reasons and final reasons should exist outside this series of accidental things. The final reason of things should be in an inevitable entity, which is what we call God. This entity is a sufficient reason for all the details. These accidental things can only get their final reason or sufficient reason in the inevitable entity. Leibniz opposes mechanical materialism, which regards matter as an inert entity that cannot move by itself. He is not satisfied with the simple mechanical action to explain the movement and change of cosmic phenomena, and tries to find the final reason (reason) for the existence and change of things. Although Leibniz's "reason" or "sufficient reason" has different meanings and explanations, the law of sufficient reason is mainly used to explain the reasons for the existence and change of things. At the same time, the law of sufficient Reason is used to demonstrate that God is omniscient, omnipotent, omnipotent, perfect, and beautiful, and belongs to ontology.
6) Leibniz put forward "contradiction principle" and "sufficient reason principle" as two principles different from truth. Leibniz put forward "contradiction principle" and "sufficient reason principle" and pointed out that there are two kinds of truths: the truth of reasoning and the truth of fact. The truth of reasoning is inevitable, but its opposite is impossible; The truth of the fact is accidental, and its opposite is possible. Leibniz believes that the truth of reasoning depends on the principle of contradiction, that is, the law of contradiction, which is obtained by deduction of pure concepts, and it does not depend on empirical facts. The truth of fact is to seek the reason or the last reason for the existence of the fact. It can't just be deduced from the definition of the object by

logical methods on the basis of the law of contradiction, but it needs to be demonstrated, which needs to have sufficient reasons and be based on the "principle of sufficient reasons". He also said that this principle (referring to the principle of sufficient reason) is unnecessary for arithmetic and geometry, but it is necessary for physics and mechanics. Obviously, Leibniz put forward the principle of sufficient reason to separate the truth obtained from facts from the truth obtained from logical reasoning.

Leibniz believes that the truth of reasoning can only be established by transcendental thinking and introspection, not by experience. He just put forward the principle of contradiction and the principle of sufficient reason as two different truths, rather than as two major principles of reasoning truth (i.e. logical truth) side by side. This is to separate the principle of sufficient reason from the principle of contradiction, and exclude the accidental truth based on facts and experience from the logical law. In fact, it was not Leibniz who first proposed the law of sufficient reason as one of the basic laws of formal logic, but Wolff, a German logician. There is no conclusion from Leibniz, that is, "the principle of sufficient reason is a principle of formal logic, which is juxtaposed with the principle of contradiction." Moreover, Leibniz's recognition of the principle of sufficient reason (that is, the argument must have sufficient reason) does not mean that there is a law of sufficient reason, nor does it mean that the law of sufficient reason must be one of the basic laws of formal logic.

7) From the so-called basis of Leibniz's principle of sufficient reason, which has no real definite content, Leibniz put forward "monadic theory". He believes that monads are the basic units of all creations in the world, and the links between monads are harmonious and adaptive, and they are linked one by one. It is connected with the list for sufficient reasons. It is connected with the list for sufficient reasons. Leibniz's exposition of the law of sufficient reason has three points: 1) it is a link between things; 2) In reasoning, there is no definite requirement for the correctness of the premise; 3) There must be premise or reason in a reasoning, and whether the reason is correct or not can't be stipulated by the law of sufficient reason. Hegel basically holds a negative attitude towards the law of sufficient reason. He pointed out that Leibniz devoted himself to the principle of sufficient reason, but he mainly opposed the sufficient and strict causality of basis, that is, the mode of action of machinery. What Leibniz wants to oppose in his mind is the purely mechanical method of perception, which is still very popular and loved by many people. Hegel thinks that the law of sufficient reason can't satisfy people in terms of theory or practice. Therefore, due to the so-called ground here, there is no truly definite content. Therefore, Leibniz's principle of sufficient reason is completely different from the law of sufficient reason in formal logic.

Leibniz did put forward the principle of sufficient reason, but the logical nature and basic requirements of this principle are often ambiguous, polysemy and unclear in Leibniz. So Russell said, what exactly Leibniz's so-called sufficient reason principle means is a controversial question [9]. This sentence is quite realistic.

4. Reformation of the Law of Sufficient Reason

The question discussed in the academic circles is whether the law of sufficient reason is the basic law of formal logic, rather than whether there is the law of sufficient reason in practical thinking. The principle of sufficient reason should be observed in practical and correct thinking, which is not debated in the logic circle of our country. Everyone agrees that the ultimate reason Leibniz talked about does not exist in fact, and the actual reason is always a relative and absolute unity. After 1978, scholars basically agreed that formal logic does not study the truth and falseness of actual thinking, regardless of the specific content of thinking, but only studies the rules of the formal structure of thinking and some simple logical methods.

What exactly is the law of sufficient reason? What are the contents and logical requirements of the law of sufficient reason? There are different opinions in previous logical works and articles, but this discussion focuses on the two requirements of the law of sufficient reason. These two requirements are respectively, first, the reason or premise or argument must be true. Second, there must be an inevitable logical connection between reason and inference, or the form of reasoning and the way of argumentation must be correct, and the formalization of laws [2] (p 199). Next, we will talk about two kinds of transformation theories.

Regarding those different opinions and viewpoints, they can be roughly divided into the following three points: 1. It is considered that the above sufficient reason law is not the law of formal logic, certainly not the basic law [10]. 2. It is considered that the above sufficient reason law is only the law of formal structure of proof, not the basic law of formal logic. The basic law of formal logic is the universal law of all the formal structures of thinking, while proof is only a part of the object of formal logic, and the law of sufficient reason does not apply to concepts, judgments and reasoning. According to this view, some logic books have put the principle of sufficient reason in the chapter of proof as a rule of proof [11, 12]. 3. It is considered that the above sufficient reason law is the basic law of formal logic. Because these scholars believe that the "truth of reasons" required by the law of sufficient reasons is a general logic requirement, or a principle requirement, and it does not study the truth of reasons, nor can it guarantee that specific reasons must be true, so this requirement is not beyond the scope of formal logic. Some comrades also call it "formal truth" to distinguish it from the study of the authen-

ticity of specific content [13, 14].

We can cancel the requirement that the reason must be true in the Law of Sufficient Reason, and only keep the requirement that the reason and the inference must have a logical connection, that is, the inference can be deduced from the reason. The law of sufficient reason after such transformation and amendment can be used as a basic law of formal logic. Its advantages are that it not only conforms to the characteristics of the object studied by formal logic, is in harmony with the logical requirements of the law of identity, the law of contradiction and the law of excluded middle, but also conforms to the nature of the science of formal logic, and also conforms to the function of the science of formal logic [2] (p195-197). Therefore, the advantages of these three aspects make the system of formal logic relatively complete and consistent.

5. Conclusion

In my opinion, Leibniz's exposition on the law of sufficient reason should not be completely negated, but should be critically inherited and further revised, supplemented and developed. Whether the law of sufficient reason exists or not depends on whether it exists in people's thinking, which is not determined by how Leibniz expressed it, or even whether Leibniz put forward the law of sufficient reason [15]. The argument and practice that Leibniz found sufficient reason law for formal logic for the first time, and therefore praised Leibniz, is unreasonable, and Leibniz himself can't agree with it. The consequences of introducing the law of sufficient reason into formal logic, whether praised or not, have little to do with Leibniz. As German logician Scholz said, "Leibniz is irresponsible for this."

Author Contributions

Shi Jing is the sole author. The author read and approved the final manuscript.

Conflicts of Interest

The authors declare no conflicts of interest.

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