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Principle of sufficient reason

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The **principle of sufficient reason** states that everything must have a [reason](#) or a [cause](#). The principle was articulated and made prominent by [Gottfried Wilhelm Leibniz](#), with many antecedents, and was further used and developed by [Arthur Schopenhauer](#) and [Sir William Hamilton, 9th Baronet](#).

History[\[edit\]](#)

The modern^[1] formulation of the principle is usually ascribed to early [Enlightenment](#) philosopher [Gottfried Leibniz](#). Leibniz formulated it, but was not an originator.^[2] The idea was conceived of and utilized by various philosophers who preceded him, including [Anaximander](#),^[3] [Parmenides](#), [Archimedes](#),^[4] [Plato](#) and [Aristotle](#),^[5] [Cicero](#),^[5] [Avicenna](#),^[6] [Thomas Aquinas](#), and [Spinoza](#).^[7] One often pointed to is in [Anselm of Canterbury](#): his phrase *quia Deus nihil sine ratione facit* (because God does nothing without reason) and the formulation of the [ontological argument for the existence of God](#). A clearer connection is with the [cosmological argument for the existence of God](#). The principle can be seen in both [Thomas Aquinas](#) and [William of Ockham](#).^[2]

Notably, the post-Kantian philosopher [Arthur Schopenhauer](#) elaborated the principle, and used it as the foundation of his system. Some philosophers have associated the principle of sufficient reason with *Ex nihilo nihil fit* ([Nothing comes from nothing](#)).^[8]^[9] [William Hamilton](#) identified the laws of inference [modus ponens](#) with the "Law of Sufficient Reason, or of Reason and Consequent" and [modus tollens](#) with its [contrapositive](#) expression.^[10]

Formulation[\[edit\]](#)

The principle has a variety of expressions, all of which are perhaps best summarized by the following:

- For every entity *X*, if *X* exists, then there is a sufficient explanation for why *X* exists.
- For every event *E*, if *E* occurs, then there is a sufficient explanation for why *E* occurs.

- For every proposition P , if P is true, then there is a sufficient explanation for why P is true.

$$\forall P \exists Q (Q \rightarrow P)$$

A sufficient explanation may be understood either in terms of *reasons* or *causes*, for like many philosophers of the period, Leibniz did not carefully distinguish between the two. The resulting principle is very different, however, depending on which interpretation is given (see [Payne's summary of Schopenhauer's *Fourfold Root*](#)).

It is an open question whether the principle of sufficient reason can be applied to [axioms](#) within a logic construction like a mathematical or a physical theory, because axioms are propositions accepted as having no justification possible within the system.^{[[citation needed](#)]} The principle declares that all propositions considered to be true within a system should be [deducible](#) from the set axioms at the base of the construction (i.e., that they ensue necessarily if we assume the system's axioms to be true).^{[[citation needed](#)]} However, Gödel has shown that for every sufficiently expressive deductive system a proposition exists that can neither be proved nor disproved (see [Gödel's incompleteness theorems](#)).

Leibniz's view[[edit](#)]

Leibniz identified two kinds of truth, necessary and contingent truths. And he claimed that all truths are based upon two principles: (1) [non-contradiction](#), and (2) sufficient reason. In the [Monadology](#), he says,

{ Our reasonings are grounded upon two great principles, that of contradiction, in virtue of which we judge false that which involves a contradiction, and true that which is opposed or contradictory to the false; And that of sufficient reason, in virtue of which we hold that there can be no fact real or existing, no statement true, unless there be a sufficient reason, why it should be so and not otherwise, although these reasons usually cannot be known by us ([paragraphs 31 and 32](#)).

Necessary truths can be derived from the [law of identity](#) (and the [principle of non-contradiction](#)): "Necessary truths are those that can be demonstrated through an analysis of terms, so that in the end they become identities, just as in Algebra an equation expressing an identity ultimately results from the substitution of values [for variables]. That is, necessary truths depend upon the principle of contradiction."^{[[11](#)]} The sufficient reason for a necessary truth is that its negation is a contradiction.^{[[4](#)]}

Leibniz admitted contingent truths, that is, facts in the world that are not necessarily true, but that are nonetheless true. Even these contingent truths, according to Leibniz, can only exist on the basis of sufficient reasons. Since the sufficient reasons for contingent truths are largely unknown to humans, Leibniz made appeal to [infinitary](#) sufficient reasons, to which [God](#) uniquely has access:

{ In contingent truths, even though the predicate is in the subject, this can never be demonstrated, nor can a proposition ever be reduced to an equality or to an identity, but the

resolution proceeds to infinity, God alone seeing, not the end of the resolution, of course, which does not exist, but the connection of the terms or the containment of the predicate in the subject, since he sees whatever is in the series.^[12]

Without this qualification, the principle can be seen as a description of a certain notion of [closed system](#), in which there is no 'outside' to provide unexplained events with causes. It is also in tension with the paradox of [Buridan's ass](#), because although the facts supposed in the paradox would present a counterexample to the claim that all contingent truths are determined by sufficient reasons, the key premise of the paradox must be rejected when one considers Leibniz's typical infinitary conception of the world.

In consequence of this, the case also of Buridan's ass between two meadows, impelled equally towards both of them, is a fiction that cannot occur in the universe....For the universe cannot be halved by a plane drawn through the middle of the ass, which is cut vertically through its length, so that all is equal and alike on both sides.....Neither the parts of the universe nor the viscera of the animal are alike nor are they evenly placed on both sides of this vertical plane. There will therefore always be many things in the ass and outside the ass, although they be not apparent to us, which will determine him to go on one side rather than the other. And although man is free, and the ass is not, nevertheless for the same reason it must be true that in man likewise the case of a perfect equipoise between two courses is impossible. (*Theodicy*, pg. 150)

Leibniz also used the principle of sufficient reason to refute the idea of [absolute space](#):

I say then, that if space is an absolute being, there would be something for which it would be impossible there should be a sufficient reason. Which is against my axiom. And I prove it thus. Space is something absolutely uniform; and without the things placed in it, one point in space does not absolutely differ in any respect whatsoever from another point of space. Now from hence it follows, (supposing space to be something in itself, beside the order of bodies among themselves,) that 'tis impossible that there should be a reason why God, preserving the same situation of bodies among themselves, should have placed them in space after one particular manner, and not otherwise; why everything was not placed the quite contrary way, for instance, by changing East into West.^[13]

As a law of thought^[edit]

The principle was one of the four recognised [laws of thought](#), that held a place in European [pedagogy](#) of [logic](#) and [reasoning](#) (and, to some extent, [philosophy](#) in general) in the 18th and 19th centuries. It was influential in the thinking of [Leo Tolstoy](#), amongst others, in the elevated form that [history](#) could not be accepted as [random](#).

A sufficient reason is sometimes described as the coincidence of every single thing that is needed for the occurrence of an effect (i.e. of the so-called *necessary conditions*).^[14] Such view could perhaps be also applied to indeterministic systems, as long as randomness is in a way incorporated in the preconditions.^[*citation needed*]

Hamilton's fourth law: "Infer nothing without ground or reason"[\[edit\]](#)

Here is how [Hamilton](#), circa 1837–1838,^{[\[15\]](#)} expressed his "fourth law" in his LECT. V. LOGIC. 60–61:

"I now go on to the fourth law.

"Par. XVII. Law of Sufficient Reason, or of Reason and Consequent:

"XVII. The thinking of an object, as actually characterized by positive or by negative attributes, is not left to the caprice of Understanding – the faculty of thought; but that faculty must be necessitated to this or that determinate act of thinking by a knowledge of something different from, and independent of; the process of thinking itself. This condition of our understanding is expressed by the law, as it is called, of Sufficient Reason (**principium Rationis Sufficientis**); but it is more properly denominated the law of Reason and Consequent (**principium Rationis et Consecutionis**). That knowledge by which the mind is necessitated to affirm or posit something else, is called the *logical reason ground*, or *antecedent*; that something else which the mind is necessitated to affirm or posit, is called the *logical consequent*; and the relation between the reason and consequent, is called the *logical connection or consequence*. This law is expressed in the formula – Infer nothing without a ground or reason.¹

"Relations between Reason and Consequent: The relations between Reason and Consequent, when comprehended in a pure thought, are the following:

1. When a reason is explicitly or implicitly given, then there must exist a consequent; and, *vice versa*, when a consequent is given, there must also exist a reason.

¹ See Schulze, *Logik*, §19, and Krug, *Logik*, §20, – ED.^{[\[16\]](#)}

"2. Where there is no reason there can be no consequent; and, *vice versa*, where there is no consequent (either implicitly or explicitly) there can be no reason. That is, the concepts of reason and of consequent, as reciprocally relative, involve and suppose each other.

"The logical significance of this law: The logical significance of the law of Reason and Consequent lies in this, – That in virtue of it, thought is constituted into a series of acts all indissolubly connected; each necessarily inferring the other. Thus it is that the distinction and opposition of possible, actual and necessary matter, which has been introduced into Logic, is a doctrine wholly extraneous to this science."

Schopenhauer's Four Forms[\[edit\]](#)

According to [Schopenhauer](#)'s [On the Fourfold Root of the Principle of Sufficient Reason](#), there are four distinct forms of the principle.

First Form: The Principle of Sufficient Reason of Becoming (*principium rationis sufficientis*

fiendi); appears as the law of causality in the understanding.^[17]

Second Form: The Principle of Sufficient Reason of Knowing (principium rationis sufficientis cognoscendi); asserts that if a judgment is to express a piece of knowledge, it must have a sufficient ground or reason, in which case it receives the predicate true.^[18]

Third Form: The Principle of Sufficient Reason of Being (principium rationis sufficientis essendi); the law whereby the parts of space and time determine one another as regards those relations.^[19] Example in arithmetic: Each number presupposes the preceding numbers as grounds or reasons of its being; "I can reach ten only by going through all the preceding numbers; and only by virtue of this insight into the ground of being, do I know that where there are ten, so are there eight, six, four."^[20]

"Now just as the subjective correlative to the first class of representations is the understanding, that to the second the faculty of reason, and that to the third pure sensibility, so is the subjective correlative to this fourth class found to be the inner sense, or generally self-consciousness."^[21]

Fourth Form: The Principle of Sufficient Reason of Acting (principium rationis sufficientis agendi); briefly known as the law of motivation.^[22] "Any judgment that does not follow its previously existing ground or reason" or any state that cannot be explained away as falling under the three previous headings "must be produced by an act of will which has a motive." As his proposition in 43 states, "Motivation is causality seen from within."^[23]

Proposed proofs of universal validity^[edit]

Several proofs have been prepared in order to demonstrate that the universe is at bottom causal, i.e. works in accord with the principle in question; perhaps not in a single case (chance may play a role, say, in the editing of this article), but that causality must be the way it works at least *in general*, in most of what we see; and that our minds are aware of the principle even before any experience. A famous argument or proof as proposed by Immanuel Kant from the form of Time, temporal ordering of events and "directionality" of time may be cited here to flesh out the intro paragraph.^[citation needed]^[clarification needed]

A proof of the a priori nature of the concept of causality may be inferred if one looks at how all perception depends on causality and the intellect. However, Arthur Schopenhauer claims that "a proof for the principle of sufficient reason in particular is especially absurd and is evidence of a want of reflection," and that he who seeks a proof "finds himself involved in that circle of demanding a proof for the right to demand a proof."^[24]

Given that causal interconnections (i.e. an "arrow of time"), as a form of the Principle of Sufficient Reason, indeed must in general exist everywhere in the universe (at least in the large scale), *backwards* causality in general might then be precluded using a form of the [paradox of free will](#) (i.e. an event that has a future source might cause us to remove that source quick

enough and thus causality would not work).^[25]^[*original research?*]

Opposing views^[edit]



This section **needs expansion**. You can help by [adding to it](#). (*January 2024*)

The [brute fact](#) approach does not require explanations for all facts.^[*citation needed*]

See also^[edit]

- [Causality](#)
- [Deterministic system \(philosophy\)](#)
- [Law of thought](#)
- [Identity of indiscernibles](#)
- [Nothing comes from nothing](#)
- [Principle of insufficient reason](#)
- [Dependent origination](#)
- [Münchhausen trilemma](#)
- [Brute fact](#)
- [Necessity and sufficiency](#)

References^[edit]

- ↑ From Hamilton 1860:67 "In modern times, the attention of philosophers was called to this law of Leibnitz, who, on the two principles of Reason and of Contradiction, founded the whole edifice of his philosophy.^{3 3} See Théodicée, § 44. [Monadologie](#), §§ 81, 82. — ED."
- ↑ **Jump up to: ^a ^b** See chapter on Leibniz and Spinoza in [A. O. Lovejoy](#), *The Great Chain of Being*.
- ↑ *Freeman, Charles (1999). The Greek Achievement: The Foundation of the Western World. Allen Lane. p. 152. ISBN 0-7139-9224-7.*
- ↑ **Jump up to: ^a ^b** [Principle of Sufficient Reason](#). *Metaphysics Research Lab, Stanford University*. 2020.
- ↑ **Jump up to: ^a ^b** [Hamilton](#) 1860:66.
- ↑ *Richardson, Kara (June 2014). "Avicenna and the Principle of Sufficient Reason". The Review of Metaphysics. **67** (4): 743–768.*

7. [↑] Della Rocca, Michael (2008). *Spinoza*. New York: Routledge. pp. 8–9.
ISBN 978-0415283304.
8. [↑] Alexander R. Pruss (2007) "Ex Nihilo Nihil Fit: Augments New and Old for the Principle of Sufficient Reason" in *Explication Topic in Contemporary Philosophy* Ch. 14.
9. [↑] Hamilton attributes this expression to [Cicero](#); Hamilton 1860:66.
10. [↑] From Hamilton 1860:241–242: "2°, "If the essential nature of an Hypothetical Syllogism consist in this, – that the subsumption affirms or denies one or other of the two parts of a thought, standing to each other in the relation of the thing conditioning and the thing conditioned, it will be the law of an hypothetical syllogism, that, – If the condition or antecedent be affirmed, so also must be the conditioned or consequent, and that if the conditioned or consequent be denied, so likewise must be the condition or antecedent. But this is manifestly nothing else than the law of Sufficient Reason, or of Reason and Consequent." ¹ The principle of this syllogism is thus variously enounced: *Posita conditione, ponitur conditionatum, sublato conditionato, tllitur conditio*. Or, otherwise, *a ratione ad rationatum, a negatione rationati ad negationem rationis, valet consequentia*. The one alternative of either rule being regulative of *modus ponens*, the other of the *modus tollens*. ² ¹ Esser, Logik, I 91, p. 174. — ED. ² See Kant, Logik §§ 75 – 76 . Krug, Logik, § 82. — ED." See in particular Hamilton's discussion that leads to this quote starting at page 239ff.
11. [↑] Muhit, Abdul. "[Leibniz on Necessary and Contingent Truths](#)". Retrieved 22 April 2014.
12. [↑] Ariew, Roger; Daniel Garber, eds. (1989). *G. W. Leibniz: Philosophical Essays*. Indianapolis: Hackett., p. 94, *On Freedom* (1689?).
13. [↑] Alexander, H.G. (1956). [The Leibniz-Clarke Correspondence](#). New York, N.Y.: Barnes and Noble.
14. [↑] See e.g. T. Hobbes, *Quaestiones de libertate et necessitate, contra Doctorem Bramhallum*, 7. Quoted in: A. Schopenhauer, [On the Freedom of the Will](#), c. 4. See also: [John Bramhall](#)
15. [↑] From the Preface: "The Lectures on Logic, like those on Metaphysics, were chiefly composed during, the session in which they were first delivered (1837–8)." The lectures were assembled, with added footnotes marked by "—ED." by Mansel and Veitch and published in 1860.
16. [↑] From the index: "SCHULZE, G. E., KRUG, W. T." These are philosophers [Gottlob Ernst Schulze](#) (23 August 1761 – 14 January 1833) and [Wilhelm Traugott Krug](#) (22 June 1770 – 12 January 1842).
17. [↑] Arthur Schopenhauer, *On The Fourfold Root of the Principle of Sufficient Reason*, S 20, trans. E. Payne, (Open Court Publishing Company, 1997), 4.
18. [↑] Arthur Schopenhauer, *On The Fourfold Root of the Principle of Sufficient Reason*, S 29, trans. E. Payne, (Open Court Publishing Company, 1997), 5.
19. [↑] Arthur Schopenhauer, *On The Fourfold Root of the Principle of Sufficient Reason*, S 36, trans.

E. Payne, (Open Court Publishing Company, 1997), 6.

20. [↑] Arthur Schopenhauer, On The Fourfold Root of the Principle of Sufficient Reason, S 38, trans. E. Payne, (Open Court Publishing Company, 1997), 7.
21. [↑] Arthur Schopenhauer, On The Fourfold Root of the Principle of Sufficient Reason, page 212, S 42, trans. E. Payne, (Open Court Publishing Company, 1997), 8.
22. [↑] Arthur Schopenhauer, On The Fourfold Root of the Principle of Sufficient Reason, S 43, trans. E. Payne, (Open Court Publishing Company, 1997), 9.
23. [↑] Arthur Schopenhauer, On The Fourfold Root of the Principle of Sufficient Reason, S 43, trans. E. Payne, (Open Court Publishing Company, 1997), 10.
24. [↑] Arthur Schopenhauer, On The Fourfold Root of the Principle of Sufficient Reason, S 14, trans. E. Payne, (Open Court Publishing Company, 1974)
25. [↑] Likewise, announcing prophecies so that they will still be correct requires, in general, a lot of high-level research of human psychics, because sometimes they will be in accord with human determination and will be welcome, but sometimes announcing them without interference with the prophesied outcome is just impossible. The requirement of such high-level research, in every single case, seems in general to rule out the possibility of backwards causality in physics.

External links^{[[edit](#)]}

- Melamed, Yitzhak; Lin, Martin. "*Principle of Sufficient Reason*". In *Zalta, Edward N.* (ed.). *Stanford Encyclopedia of Philosophy*.
- [Sir William Hamilton, 9th Baronet](#), ([Henry L. Mansel](#) and [John Veitch](#), ed.), 1860 *Lectures on Metaphysics and Logic, in Two Volumes. Vol. II. Logic*, Boston: Gould and Lincoln.
- Alexander R. Pruss, [The Principle of Sufficient Reason: A Reassessment](#)
- "*Gottfried Leibniz: Metaphysics*". *Internet Encyclopedia of Philosophy*.