

Ilija Barukčić

Theoriae
causalitatis
principia
mathematica

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Earth rising above the moon's horizon viewed from the Apollo 11 spacecraft (Astronauts Neil A. Armstrong, commander, Edwin E. Aldrin and Michael Collins) on July 20, 1969. The lunar terrain pictured is in the area of Smyth's Sea on the nearside.

Contents

1	Human knowledge and proof methods	5
1.1	Induction and experiment	6
1.2	Deduction and logical fallacies	8
1.3	Proof methods and human knowledge	9
1.3.1	Proof by thought experiments	12
1.3.2	Proof by counterexample	12
1.3.3	Proof by modus ponens	14
1.3.4	Proof by modus ponens contrapositivus	17
1.3.5	Proof by modus sine	18
1.3.6	Proof by modus tollens	19
1.3.7	Proof by modus inversus	20
1.3.8	Proof by other methods	22
2	Causality and science	23
2.1	Causality and philosophy	24
2.1.1	Aristotle (384-322 BCE)	24
2.1.2	Paul-Henri Thiry d’Holbach (1723-1789)	25
2.1.3	David Hume (1711-1776)– a posteriori	27
2.1.4	Post Humeans – Hume’s heritage used up	31
2.1.5	Immanuel Kant (1724-1804)– a priori	33
2.1.6	Georg Wilhelm Friedrich Hegel (1770-1831) – both	40
2.1.7	Post Hegelians	46
2.1.8	Causality and probability	47
2.2	Causality and mathematics	48
2.2.1	Co-relation is not causation	49

2.2.2	Association is not causation	55
2.2.3	Independence is not causation	66
2.3	Causality and physics	68
2.3.1	Determinism	69
2.3.2	Indeterminism	71
2.3.3	N index D-dimensional causal relationship	74
3	Basic definitions	79
3.1	Basics	80
3.1.1	Numbers	80
3.1.2	Geometry	94
3.1.3	Probability	111
3.2	Expectation	121
3.2.1	Probability triple	121
3.2.2	The single event	122
3.2.3	The probability of a single event	125
3.2.4	Expectation value of a single event	129
3.2.5	Expectation value in general	134
3.2.6	Variance	136
3.2.7	Co-variance	142
3.3	Tensor algebra	143
3.3.1	Metric tensor	143
3.3.2	Basic rules of tensor algebra	146
3.3.3	Extended rules of tensor algebra	150
4	Conditions	163
4.1	Conditions	164
4.1.1	Coincidence	164
4.1.2	Exclusion relationship	165
4.1.3	Inclusive or	169
4.1.4	Neither U nor W condition	172
4.1.5	Necessary condition [<i>Conditio sine qua non</i>] ..	174
4.1.6	Anti necessary condition	181
4.1.7	Sufficient condition	181
4.1.8	Anti sufficient condition	184
4.1.9	Necessary and sufficient conditions	185
4.1.10	Either or conditions	188
4.2	Cause and condition	191
4.2.1	Without a cause no effect	192
4.2.2	If cause, then effect	194

4.2.3	Cause is a necessary and sufficient condition of an effect	196
5	Relative Risk and Odds ratio	201
5.1	Background	202
5.2	Definitions	203
5.2.1	Contingency table	203
5.2.2	Relative risk (RR)	203
5.2.3	Vaccine efficacy (VE)	206
5.2.4	Odds ratio	207
5.2.5	Relative risk reduction (RRR)	208
5.2.6	Experimental event rate (EER)	208
5.2.7	Control event rate (CER)	208
5.2.8	Absolute risk reduction (ARR)	208
5.2.9	Number needed to treat (NNT)	208
5.2.10	Number needed to harm (NNH)	209
5.2.11	Index of relationship (IOR)	209
5.3	Theorems	211
5.3.1	Counterexample: relative risk.	211
5.3.2	The identity of distinguished I	212
5.3.3	The identity of distinguished II	214
5.3.4	Necessary condition and relative risk	216
5.3.5	Sufficient condition and relative risk	220
6	Sequences	225
6.1	Markov chains	226
6.2	Definition sequence	226
6.3	Time series and sequences	228
6.3.1	X before Y	228
6.3.2	X not before Y and Y not after X	229
6.3.3	After X does occur Y	231
6.3.4	After X does not occur Y	233
6.3.5	X need to occur before Y	234
6.3.6	X need not to occur before Y	237
6.3.7	Neither X nor Y sequence	238
6.3.8	X or Y sequence	240
6.3.9	After X always Y	242
6.3.10	Either X or Y sequence	245
6.4	Time series and causality	247

7	Definitions and Causality	249
7.1	Mono-Causality	250
7.1.1	Causal relationship k	250
7.1.2	Causal relationship k and Fisher's exact test ...	251
7.1.3	Causal relationship k and the cumulative distribution function	253
7.2	Multicausality	255
7.2.1	One cause and a chain of effects	256
7.2.2	One cause and many effects	257
7.2.3	Many causes and one effect	258
7.2.4	Many causes and many effects	259
7.2.5	Many causes and a chain of effects	260
7.2.6	A chain of causes and one effect	261
7.2.7	A chain of causes and many effects	263
7.2.8	A chain of causes and a chain of effects	264
7.2.9	Cybernetics and circular causality	265
7.3	General relativity and causality	267
8	Axioms	273
8.1	Axioms in general	274
8.2	Axioms and theories	274
8.3	Axioms and experiments	275
9	Axiom I (Lex identitatis)	277
9.1	Lex identitatis	278
9.2	Principium identitatis	280
9.3	The relationship between identity and difference	281
10	Axiom II (Lex contradictionis)	285
10.1	Lex contradictionis	286
10.2	Principium contradictionis	286
10.3	The principle of explosion	288
11	Axiom III (Lex negations)	291
11.1	Lex negationis	293
11.2	Principium negationis	294
11.3	History and negation	295
11.3.1	Aristotle and negation	295
11.3.2	Spinoza and negation	295
11.3.3	Hegel and negation	296

11.3.4	Boole and negation	297
11.3.5	Marx and Engels and negation	298
12	Theorems of negation	305
12.1	Negation and arithmetic	306
12.2	Negation and geometry	316
12.3	Negation and general relativity theory	319
13	Theorems of probability	321
13.1	Anti Chebyshev - The Chebyshev equality	321
13.2	The average probability	323
13.3	The left tailed P Value	325
13.4	Anti Zadeh - Refutation of Fuzzy logic	327
13.4.1	Fuzzy logic - The negation operator	327
13.4.2	Fuzzy logic - The conjunction operator	328
13.4.3	Fuzzy logic - The disjunction operator	328
13.4.4	Refutation of Fuzzy logic	329
14	Mono-Causality	331
14.1	Introduction	332
14.2	Basics	333
14.2.1	The difference between cause and not-cause	333
14.2.2	The difference between cause and effect	334
14.2.3	The asymmetry of the causal relation	336
14.3	Theorems of mono-causality	341
14.3.1	The identity of cause and effect	341
14.3.2	The difference between cause and effect	350
14.3.3	The contradiction between cause and effect	352
15	Multi-Causality	363
15.1	Introduction	364
15.2	Theorems of multi-causality	365
15.2.1	One cause and a chain of effects	365
15.2.2	One cause and many effects	368
15.2.3	Many causes and one effect	371
15.2.4	Many causes and many effects	375
15.2.5	Many causes and and a chain of effects	379
15.2.6	A chain of causes and one effect	383
15.2.7	A chain of causes and many effects	387
15.2.8	A chain of causes and a chain of effects	391

15.3	General relativity and causality	395
16	Law's of nature	403
16.1	Indeterminism	404
16.2	Determinism	405
16.3	The law of nature relationship g	407
17	Proof of God's existence	411
17.1	Science and ideology	412
17.2	Proof/Disproof of the existence of God	413
17.3	General relativity and the existence of God	414
	Notice	447
	Index	455

VOLUME I

THE GENERAL THEORY OF

CAUSALITY

“Time is not
something objective and real,
neither a substance, nor an accident, nor a relation. ”

(see Kant, 1770)
(see also (English) Kant, 1894, p. 61)

There is no doubt. Kant’s own view on space does not differ from his own view on time at all.

“Space is not
something objective and real,
neither substance, nor accident, nor relation ;
but subjective and ideal ... ”

(see also Kant, 1770)
(see also (English) Kant, 1894, p. 65)

Kant’s category of a fire in a human mind and the fire itself outside a human mind need to be distinguished. The category of a fire in a human mind does not possess the possibility to kill real-world people. However, in contrast to Kant’s category of a fire in a human mind real-world fires sometimes kill more people each year than all natural disasters. Even a small fire can become a major fire that ravages a home and may threaten the lives of the people inside. Sometimes only minutes or even seconds are left to escape such a house fire and to rescue itself and its own life. However, following Kant, we need only to be concerned about the category of such a fire in our human mind (“... wir haben es ... nur mit unseren Vorstellungen zu thun; wie Dinge an sich selbst ... seyn mögen, ist gänzlich außer unserer Erkenntnißsphäre. ”(see also Kant, 1790, p. 235)) but not about the fire itself. We just cannot recognize how the fire itself is (“wie Dinge an sich selbst ... seyn mögen, ist gänzlich außer unserer Erkenntnißsphäre. ”(see also Kant, 1790, p. 235)). Any fire has the potential to burn any evidence within minutes in particular with regard to the correctness of Kant’s transcendental conception of causality, the same is refuted. ■

Kant himself, in contrast to Bishop George Berkeley (1685–1753), is an advocate of a fundamental conception of idealism which concede to some extent the existence of something independent of human mind.

However, everything the humans can know about this mind-independent reality depends according to Kant himself on human mind itself and is at the end not independent of human mind. Kant, tends to reduce objective reality or of everything that exists to some kind of perception or of experience and allows at the end that everything that exists may be in some way mental while ending up at a kind of circular reasoning (circulus in probando). In last consequence, human mind would have to create the object observed or earth's moon would exist only if someone looks at the same ("... wir haben es ... nur mit unseren Vorstellungen zu thun; "(see also Kant, 1790, p. 235)). Kant's philosophical insights seduce us to develop thousands of categories of millions of trees but does not allow us to see the forest as a Ding an sich. In the end, and to some extent contrary to Kant, view positions of Albert Einstein (1879–1955) may turn out to be right.

“We often discussed his notions on **objective reality**.
I recall that during one walk **Einstein** suddenly stopped, turned to
me and **asked whether** I really believed that
the moon exists only when I look at it. ”

(see also Pais, 1979, p. 907)

One is not surprised about Einstein's Anti-Kantian position.

“The elements of ... reality cannot be determined by a priori
philosophical considerations, but must be found by an appeal to
results of experiments and measurements. ”

(see Albert Einstein et al., 1935, p. 777)

That is only one among the many points why Kant's approach to objective reality is likely to fail to withstand and to meet the challenges of change. In the light of the issue to be addressed, it seems perfectly natural that Kant's a priori demand had to be rejected once and for all (see Friedman, 2008), especially under the conditions of Einstein's theory of relativity. In general, we might confidently ask ourselves whether it is permissible at all to assume any connection between Kant's 'Thing in itself' and an expected value of a random variable or the results of measurements as obtained by Einstein's co-moving observer. Especially, are the results

2.1.6 Georg Wilhelm Friedrich Hegel (1770-1831) – both

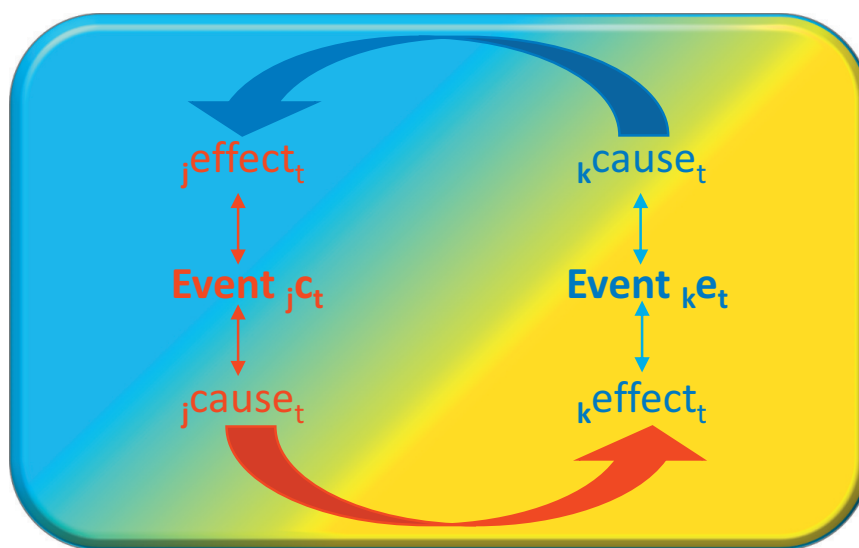
Kant's respond to Hume's scepticism resulted in a much greater sceptical conclusion of Kant himself. Kant's theory understood as correct does not exclude that a world in itself or a 'Thing-in-itself' (Ding an sich) may exist. Regrettably and without any logical need, Kant demands ex cathedra that the humans can know nothing about the world in itself or about the 'Thing-in-itself' (Ding an sich). Kant denies any possibility of epistemological progress **from the known to the unknown**. Therefore, the only option left open for human knowledge is the following:

“... das, was der Erscheinung der Materie,
als **Ding an sich** selbst, zum Grunde liegt
... bleibt ... ohne allen Zweifel ...
außer dem Felde aller menschlichen Erkenntniß ... ”

(see also Kant, 1790, p. 428)

In simple words of an agnosticist par excellence. “What matter may be as **a thing in itself** ... is **completely unknown to us** ... ”(see Kant, 1929, Critique of pure Reason, p. 344). Georg Wilhelm Friedrich Hegel (1770-1831) rejected Kant's far-reaching and fundamentally sceptical conclusion. In attacking Kant, the 19th Century German post-Kantian idealistic philosopher **Georg** (see Hegel, 1812) **Wilhelm** (see Hegel, 1813) **Friedrich** (see Hegel, 1816) **Hegel**(1770-1831) provided an own(see Hegel, 1998, p. 558-571), very abstract and purely idealistic philosophical account of **the nature of causality** (see also Hegel, 1813, pp. 261-282) while relying on the dialectical method. However, it is of the utmost importance that Hegel himself started his theory from a purportedly logical point of view. It did not take a very long period of time in the further process of the development of science, and Hegel himself has been taken over by Karl Marx (1818-1883). In short, Marx(see Marx, 1867) himself as a truly convinced post-Hegelian turned Hegel's dialectical idealistic philosophy upside down in putting the same on its feet by inverting Hegel's dialectical idealistic philosophy into a dialectical materialist theory.

Hegel's statement before translated into English. "Therefore, though the **cause** has an **effect** and is at the same time itself **effect**, and the **effect** not only has a **cause** but is also itself **cause**, yet the **effect** which the **cause** has, and the **effect** which the **cause** is, are different, as are also the **cause** which the **effect** has, and the **cause** which the **effect** is." (see also Hegel, 1998, p. 565/566). Hegel formulates the relationship between a cause and an effect in his typical way. However, figure 4 may illustrate in more detail what Hegel is talking about.



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Fig. 4 Every event is determined at the same time t as the unity of a cause and an effect (see Hegel, 1813, p. 273).

German idealism effectively ended shortly after Hegel's death, especially due to view anti-idealist authors like Ludwig Andreas Feuerbach (1804-1872), Karl Marx (1818-1883) and of course other too. However, according to Hegel himself, this is not a pity, '**ne regrette rien**'.

"What is necessary cannot be otherwise ..."

(see also Hegel, 1998, p. 549)

2.2.1 Co-relation is not causation

In spite of the adverse circumstances, one of the first documented and detailed mathematical trials to mathematize the relationship between cause and effect can be attributed to the concept of co-relation, a mathematically evolutionary pre-stage of causation. Decades of experience has taught us that numerous hands make light work. This is like ever of vital importance with respect to every scientific issue to which attention should be drawn. Of particular note is that the French physicist Auguste Bravais (1811-1863) discussed the issue of co-relation (see also Bravais, 1846) already in 1846. Francis (see also Galton, 1877) Galton (1822 - 1911), the 1909 knighted English Victorian statistician and anthropologist, was the first to measure the "... the index of co-relation ..." (see Galton, 1888) while the term 'coefficient of correlation' has been coined by Francis Ysidro Edgeworth (1845-1926) in 1892 (see Edgeworth, 1892). In the following, Karl Pearson (1857 - 1936) himself made another important contribution (see also K. Pearson, 1896, p. 261) to the theory of co-relation. John Burdon Sanderson Haldane (1892-1964) is writing that Pearson

"... spent about a year in the universities of Heidelberg and Berlin ... At about this time he began to spell his Christian name with a K instead of a C. ... a special homage to Karl Marx, for we know that he later lectured on Marx, and ... when in Germany the police once searched his rooms ... one of Marx's books was the most subversive of the documents which they found there ... "

(see also Haldane, 1957, p. 304)

In fact, following Pearson (see also K. Pearson, 1896) Pearson (1857 - 1936), it is of crucial importance to recognize that Bravais developed a complete theory of co-relation for the first time in history.

"The fundamental theorems of co-relation were for the first time and almost exhaustively discussed by B r a v a i s ('Analyse mathématique sur les probabilités des erreurs de situation d'un point.' Mémoires par divers Savans, T. IX., Paris, 1846, pp. 255-332) nearly half a century ago."

(see also K. Pearson, 1896, p. 261)

THEOREM 16 (The coefficient of co-relation) *Let Y denote a quantity (i.e. effect or outcome variable), let $p(Y)$ denote the probability of this quantity. Let $E(Y) \equiv Y \times p(Y)$ denote the expectation value of Y . Let X denote another quantity (i.e. cause or input variable), let $p(X)$ denote the probability of this quantity. Let $E(X) \equiv X \times p(X)$ denote the expectation value of X . The co-relation coefficient is based on a quantity dominated, mechanical understanding of the relationship between two factors like X and Y .*

Proof **If** the premise

$$\underbrace{+1 = +1}_{(Premise)} \quad (11)$$

is true, **then** the conclusion

$$\begin{aligned} \rho(Y, X) &\equiv \frac{E((Y - E(Y)) \times (X - E(X)))}{E(Y - E(Y)) \times E(X - E(X))} \\ &\equiv \frac{\sigma(Y, X)}{\sigma(Y) \times \sigma(X)} \equiv +1 \end{aligned} \quad (12)$$

is also true, the absence of any technical errors presupposed. The premise

$$+ 1 \equiv +1 \quad (13)$$

is true. Multiplying this premise (i.e. axiom) by Y , it is

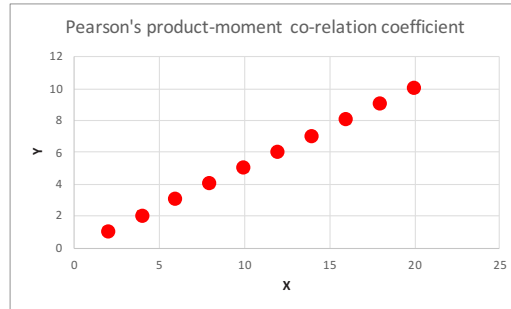
$$Y \equiv Y \quad (14)$$

Bravais (1811-1863) (see Bravais, 1846) - Pearson's (1857-1936) "product-moment coefficient of co-relation" (see Galton, 1877; K. Pearson, 1896) in contrast to the causal relationship k (see I. Barukčić, 1989, 1997, 2005, 2016e, 2017b, 2017c) is based on the demand that $Y = X$. Based on this fundamental assumption, equation 12 can be rearranged as

$$Y \equiv X \quad (15)$$

Two which are different are as well identical with each other. This basic relationship between Y and X is illustrated symbolically fig. 5.

Fig. 5 Pearson's product moment coefficient of correlation and the mechanical relationship between Y and X.



The logical consequence of Eq. 15 is that

$$E(Y) \equiv E(X) \quad (16)$$

Equation 15 demands too that

$$Y^2 \equiv X^2 \quad (17)$$

Equation 17 demands that

$$E(Y^2) \equiv E(X^2) \quad (18)$$

Equation 15 can be rearranged as

$$Y - E(Y) \equiv X - E(Y) \quad (19)$$

According to equation 16, equation 19 changes to

$$Y - E(Y) \equiv X - E(X) \quad (20)$$

In other words, we must accept the equality of

$$E(Y - E(Y)) \equiv E(X - E(X)) \quad (21)$$

By squaring equation 21, it is

$$E(Y - E(Y))^2 \equiv E(X - E(X))^2 \quad (22)$$

or

$$E(Y - E(Y)) \times E(Y - E(Y)) \equiv E(X - E(X)) \times E(X - E(X)) \quad (23)$$

Based on equation 21, equation 23 can be rearranged as

$$E(Y - E(Y)) \times E(X - E(X)) \equiv E((X - E(X)) \times (X - E(X))) \quad (24)$$

Based on equation 15 and equation 16, equation 24 can be rearranged as

$$E(Y - E(Y)) \times E(X - E(X)) \equiv E((Y - E(Y)) \times (X - E(X))) \quad (25)$$

Equation 25 can be simplified (see Sachs, 1992, p. 496) as (see also Kolmogoroff, 1950, p. 60)

$$E((Y - E(Y)) \times (X - E(X))) \equiv E(Y - E(Y)) \times E(X - E(X)) \quad (26)$$

Rearranging equation 26, Bravais (see Bravais, 1846) (1811-1863) - Pearson's (1857-1936) "*product-moment coefficient of co-relation*" (see Galton, 1877; K. Pearson, 1896) follows (see Sachs, 1992, pp. 496-497) as

$$\begin{aligned} \rho(Y, X) &\equiv \frac{E((Y - E(Y)) \times (X - E(X)))}{E(Y - E(Y)) \times E(X - E(X))} \\ &\equiv E\left(\left(\frac{Y - E(Y)}{\sigma(Y)}\right) \times \left(\frac{X - E(X)}{\sigma(X)}\right)\right) \\ &\equiv \frac{\sigma(Y, X)}{\sigma(Y) \times \sigma(X)} \\ &\equiv +1 \end{aligned} \quad (27)$$

■

Bravais (see Bravais, 1846) (1811-1863) - Pearson's (1857-1936) "*product-moment coefficient of co-relation*" (see Galton, 1877; K. Pearson, 1896) is based on the assumption that **a quantity Y is equivalent to a quantity X**. Under this assumption, it is possible (see theorem 16, EQ. 27) to derive Pearson's product-moment coefficient of co-relation in a technically correct way. However, this implies too, that the product-moment coefficient of co-relation is not identical with causation. A cause effect relationship cannot be reduced under any circumstances to a mechanical relationship between two quantities. However, Pearson's product-moment coefficient of co-relation demands us precisely to accept such a simple and mechanical relationship between two quantities as being identical with causation. No wonder that Karl Pearson (1857-1936)

himself “rejected causal thinking.”(see Blalock, 1964, p. 39). Pearson’s product-moment coefficient of co-relation does not account for sure for causation, as demonstrated by theorem 16. In this context, it is relatively easy to get convinced that co-relation and causation are not identical in order to draw reliable conclusions (from observational data). Many times, mathematical examples or proofs are able to illustrate the truth of a statement. However and conversely, one single counterexample, experiment et cetera is enough and posses the theoretical potential to demonstrate the falsity of a theory, of a theorem et cetera. But the question remains, what makes the logical-mathematical difference between causation and co-relation? Theorem 17 should be able to shed light on the matter.

THEOREM 17 (Co-relation is not causation) *Let Y denote a quantity (i.e. outcome), let $p(Y)$ denote the probability of this quantity. According to Kolmogorov, who applies “the theory of probability to the actual world of experiments ... ”(see Kolmogoroff, 1950, p. 3) it is $E(Y) \equiv Y \times p(Y)$ (see Kolmogoroff, 1933) denoted the expectation value of Y . Let X denote another quantity, let $p(X)$ denote the probability of this quantity. Let $E(X) \equiv X \times p(X)$ denote the expectation value of X . The co-relation coefficient is based on a quantity dominated, mechanical understanding of the relationship between two factors like X and Y . Pearson’s product-moment coefficient of co-relation is grounded on the mathematical starting point that,*

$$p(Y) \equiv p(X) \quad (28)$$

which is not generally given. Pearson’s product-moment coefficient of co-relation, even if mathematically correct, is refuted.

Proof If the premise

$$\underbrace{+1 = +1}_{(Premise)} \quad (29)$$

is true, **then** the conclusion

$$p(Y) \equiv p(X) \quad (30)$$

is also true, the absence of any technical errors presupposed. The premise

$$+ 1 \equiv +1 \quad (31)$$

is true. Multiplying this premise (i.e. axiom) by $E(Y)$, it is

$$E(Y) \equiv E(Y) \quad (32)$$

According to EQ. 16, EQ. 32 changes to

$$E(Y) \equiv E(X) \quad (33)$$

The expectation value of Y is defined as $E(Y) \equiv Y \times p(Y)$ while the expectation value of X is known to be defined as $E(X) \equiv X \times p(X)$. EQ. 32 can be rearranged as

$$Y \times p(Y) \equiv X \times p(X) \quad (34)$$

According to EQ. 15 it is $Y \equiv X$. Rearranging EQ. 34, we obtain

$$Y \times p(Y) \equiv Y \times p(X) \quad (35)$$

Dividing EQ. 35 by Y yields

$$p(Y) \equiv p(X) \quad (36)$$

■

Meanwhile, there are more than enough other (Sober, 2001) counterexamples which were able to provide evidence that causation is not identical with causation, co-relation is not enough for causal inference. Thus far, let us assume again that Y may denote something like an effect while X may denote something like a cause. Pearson's product-moment coefficient of co-relation demands us to accept under any circumstances a mechanical and fixed relationship between the probabilities of a cause and an effect (see theorem 17, Eq. 36). It is hard to deny that such circumstances may exist. But this condition is not universally applicable. Causality and a mathematical formula describing the same is and need to be generally valid. The theorem 17 demonstrates exactly one of the reasons why Pearson's product-moment coefficient of co-relation collapses mathematically on the field of causality more or less entirely.

13.4 Anti Zadeh - Refutation of Fuzzy logic

An extreme advantage but equally a disadvantage of Boolean logic too is that the truth value is always either +0 or +1. The need and the desire to develop a logical reasoning which is nearer to objective reality with allows vague or imprecise statements, a so-called multi-valued logic or dialectical logic, lead to the development of fuzzy logic by the Azerbaijani scientist Lotfi Aliasker Zadeh (1921 –2017). Fuzzy logic (see also Lee & Zadeh, 1969; Zadeh, 1965, 1968, 1971, 1984, 1996, 1997) is more or less a special form of logic which belongs to a family of many-valued logics(see also Gödel, 1932; Łukasiewicz, 1920; Post, 1920) in which the truth value is any real number between +0 and +1. However, Jan Łukasiewicz (1878–1956) and Alfred Tarski (1901–1983) published an early example of a many-valued logic (see also Łukasiewicz & Tarski, 1930) long before the inception of the theory of fuzzy sets as proposed by Zadeh himself. Lotfi Aliasker Zadeh proposed the following operators of Fuzzy logic.

13.4.1 Fuzzy logic - The negation operator

Bernoulli trial t	$R U_t$	$\neg R U_t$	Boolean NOT $\neg R U_t$	Fuzzy NOT $1 - R U_t$
1	1	0	0	0
2	1	0	0	0
3	0	1	1	1
4	0	1	1	1
.
.
.

Table 45 Boolean NOT operator and Fuzzy logic NOT operator are identical.

13.4.2 Fuzzy logic - The conjunction operator

Bernoulli trial t	${}_R U_t$	${}_R W_t$	Boolean AND $({}_R U_t \cap {}_R W_t)$	Fuzzy AND Minimum(${}_R U_t, {}_R W_t$)
1	1	1	1	1
2	1	0	0	0
3	0	1	0	0
4	0	0	0	0
.
.
.

Table 46 Boolean logic AND operator and Fuzzy logic AND operator.

13.4.3 Fuzzy logic - The disjunction operator

Bernoulli trial t	${}_R U_t$	${}_R W_t$	Boolean OR $({}_R U_t \cup {}_R W_t)$	Fuzzy OR Maximum(${}_R U_t, {}_R W_t$)
1	1	1	1	1
2	1	0	1	1
3	0	1	1	1
4	0	0	0	0
.
.
.

Table 47 Boolean logic OR operator and Fuzzy logic OR operator.

13.4.4 Refutation of Fuzzy logic

COUNTEREXAMPLE 72 (REFUTATION OF FUZZY LOGIC BY A COUNTEREXAMPLE)

Let $p({}_R U_t)$ denote the probability of an event ${}_R U_t$ at a certain Bernoulli trial / point in (space-) time t . Let $p({}_R W_t)$ denote the probability of an event ${}_R W_t$ at the same Bernoulli trial / point in (space-) time t . Let $p({}_R U_t, {}_R W_t)$ denote the joint-probability of events ${}_R U_t$ and ${}_R W_t$ at the same Bernoulli trial / point in (space-) time t . Fuzzy logic demands that

$$+ 0 \equiv +1 \quad (650)$$

Proof (by counterexample)

Axiom I or

$$+ 1 \equiv +1 \quad (651)$$

as our starting point of this proof by counterexample is true. Rearranging Eq. 651, it is

$$p({}_R U_t \cap {}_R W_t) \equiv p({}_R U_t \cap {}_R W_t) \quad (652)$$

In **the case of independence** of both events ${}_R U_t$ and ${}_R W_t$ Fuzzy logic must yield contradictory free results. In this case, we must accept as true that

$$p({}_R U_t \cap {}_R W_t) \equiv p({}_R U_t) \times p({}_R W_t) \equiv \text{Minimum}(p({}_R U_t), p({}_R W_t)) \quad (653)$$

Under circumstances of independence where $p({}_R U_t) = 0.5$ and $p({}_R W_t) = 0.4$, Eq. 653 yields the following results.

$$p({}_R U_t \cap {}_R W_t) \equiv 0.5 \times 0.4 \equiv \text{Minimum}((0.5), (0.4)) \quad (654)$$

or

$$0.2 \equiv 0.4 \quad (655)$$

Simplifying Eq. 655, it is

$$+ 0 \equiv 0.2 \quad (656)$$

and at the end

$$+ 0 \equiv +1 \quad (657)$$

This counterexample has refuted the Fuzzy logic.

√

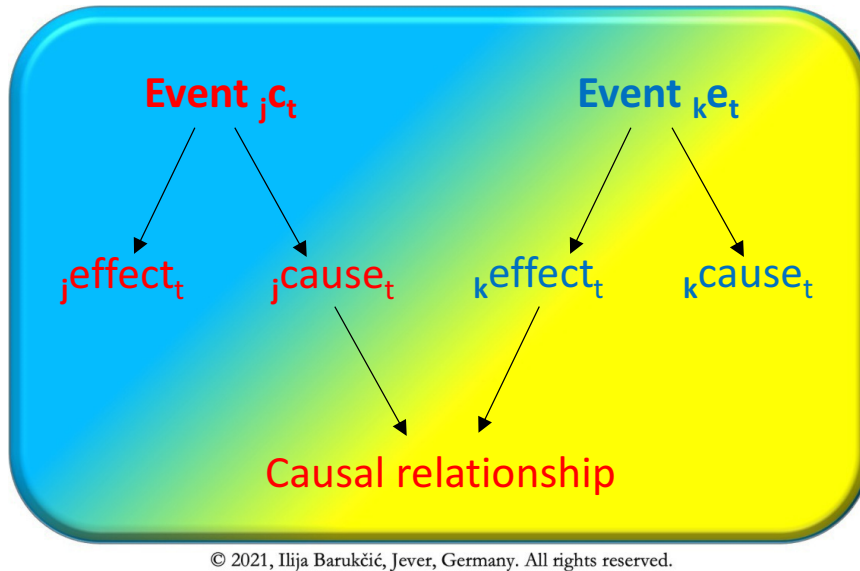


Fig. 16 The unity and the struggle between a cause and an effect (see Hegel, 1813, p. 273).

Hegel's position outlined just before translated into English. "Therefore, though the **cause** has an **effect** and is at the same time itself **effect**, and the **effect** not only has a **cause** but is also itself **cause**, yet the **effect** which the **cause** has, and the **effect** which the **cause** is, are different, as are also the **cause** which the **effect** has, and the **cause** which the **effect** is." (see also Hegel, 1998, p. 565/566). Hegel formulates the relationship between a cause and an effect in his typical way. The cause has within itself those properties in which the determinateness of the cause has to be found and vice versa. The effect is not an effect as contrasted with another, but possesses within itself the determinateness whereby it is an effect. The cause itself is determined with reference to an otherness, the effect, but in such a manner that its nature is to negate this its own otherness. However, the other of the cause itself, the effect, is itself negating the cause and excluding this its own non-being from itself, it negates its relationship to its own other, the cause. In other words, both, cause and effect, are negating each other. However, can a cause be a cause in itself, apart from any relation to the effect and vice versa? Can an effect be an effect in itself, apart from any relation to the cause?

Under conditions of Einstein's general theory of relativity, the causal relationship k (**Einstein's Weltformel**), denoted as $k(U_{kl\mu\nu\dots}, W_{kl\mu\nu\dots})$, is given by

$$\begin{aligned}
& k(U_{kl\mu\nu\dots}, W_{kl\mu\nu\dots}) \\
& \equiv \frac{\sigma(U_{kl\mu\nu\dots}, W_{kl\mu\nu\dots})}{\sqrt[2]{\sigma(U_{kl\mu\nu\dots}) \cap \sigma(W_{kl\mu\nu\dots})}} \\
& \equiv \frac{\sigma(U_{kl\mu\nu\dots}, W_{kl\mu\nu\dots})}{\sigma(U_{kl\mu\nu\dots}) \cap \sigma(W_{kl\mu\nu\dots})} \\
& \equiv \frac{(U_{kl\mu\nu\dots} \cap_R W_{kl\mu\nu\dots}) \cap (p(U_{kl\mu\nu\dots}, W_{kl\mu\nu\dots}) - (p(U_{kl\mu\nu\dots}) \cap p(W_{kl\mu\nu\dots})))}{\sqrt[2]{((U_{kl\mu\nu\dots})^2 \cap (p(U_{kl\mu\nu\dots}) \cap (1_{kl\mu\nu\dots} - p(U_{kl\mu\nu\dots}))) \cap (W_{kl\mu\nu\dots})^2 \cap (p(W_{kl\mu\nu\dots}) \cap (1_{kl\mu\nu\dots} - p(W_{kl\mu\nu\dots}))))} \\
& \equiv \frac{(U_{kl\mu\nu\dots} \cap_R W_{kl\mu\nu\dots}) \cap (p(U_{kl\mu\nu\dots}, W_{kl\mu\nu\dots}) - (p(U_{kl\mu\nu\dots}) \cap p(W_{kl\mu\nu\dots})))}{\sqrt[2]{((U_{kl\mu\nu\dots}) \cap_R W_{kl\mu\nu\dots}) \cap (p(U_{kl\mu\nu\dots}) \cap (1_{kl\mu\nu\dots} - p(U_{kl\mu\nu\dots}))) \cap (p(W_{kl\mu\nu\dots}) \cap (1_{kl\mu\nu\dots} - p(W_{kl\mu\nu\dots})))}} \\
& \equiv \frac{(p(U_{kl\mu\nu\dots}, W_{kl\mu\nu\dots}) - (p(U_{kl\mu\nu\dots}) \cap p(W_{kl\mu\nu\dots})))}{\sqrt[2]{((p(U_{kl\mu\nu\dots}) - p(U_{kl\mu\nu\dots})) \cap (p(W_{kl\mu\nu\dots}) \cap (1_{kl\mu\nu\dots} - p(W_{kl\mu\nu\dots}))))}}
\end{aligned}$$

VOLUME III

THE LAWS OF

NATURE

the mathematician if the laws of mathematics referred to objects of our mere imagination, and not to objects of reality. '

$$R_{ab} + \left(\frac{R}{2}\right) \times g_{ab} + (\Lambda * g_{ab}) = \left(\frac{8 * \pi * \gamma}{c^4}\right) * T_{ab}$$

}
}
non-material world
real world

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Fig. 19 Einstein's field equation and the existence of God.

Einstein himself in his original(see also Albert Einstein, 1921, p. 3)
German words.

“Die Mathematik genießt vor allen anderen Wissenschaften aus einem Grunde ein besonderes Ansehen; ihre Sätze sind absolut sicher und unbestreitbar, während die aller andern Wissenschaften bis zu einem gewissen Grad umstritten und stets in Gefahr sind, durch neuentdeckte Tatsachen umgestoßen zu werden. Trotzdem brauchte der auf einem anderen Gebiete Forschende den Mathematiker noch nicht zu beneiden, wenn sich seine Sätze nicht auf Gegenstände der Wirklichkeit, sondern nur auf solche unserer bloßen Einbildung bezögen.”

(see Albert Einstein, 1921, p. 3)

Unfortunately, it is unavoidable to put forward view slight, critical remarks regarding Einstein's position on mathematics. The most definitions, rules or laws of mathematics are referred to objects of mere human

mind and human imagination and exactly because of this not absolutely certain and not indisputable. Such mathematical definitions, rules or laws et cetera are debatable and in constant danger of being overthrown. To carry it to the extreme: while the Christian Bible simply insists on the doctrine: God created the world, mathematicians just define ex cathedra mathematical rules, facts et cetera i.e. like $0! = 1$ (see I. Barukčić, 2018d, 2019g, 2019h, 2020b; I. Barukčić & Ufuoma, 2020; J. P. Barukčić & Barukčić, 2016) as individually and personally desired (**parte mea, regulae meae**). Clearly, one should be allowed to ask the question of

**where is
the methodological difference between
religion and today's mathematics?**

Taking account of all the relevant arguments mentioned before, the disregard of elementary rules of science in today's mathematics while considering Einstein's offhand remark when discussing the definitions, the rules et cetera of mathematics in a café conversation with engineer Gustave Ferrière (see also Brian, 1996, p. 76) nothing else remains to be done but to join Einstein in his radical stance on **today's** mathematics and to acknowledge publicly that

**“I don't
believe in
mathematics.”**

(see also Brian, 1996, p. 76)

References

- Anderson, P. W. (1972). More is different. *Science*, 177(4047), 393–396. doi:[10.1126/science.177.4047.393](https://doi.org/10.1126/science.177.4047.393)
- Aristotle, Ross, W. D., & Smith, J. A. (1908). *Volume viii. metaphysica*. The works of Aristotle. At The Clarendon Press. Retrieved from <http://archive.org/details/worksofaristotle12arisuoft>
- Ayer, A. J. (1952). Negation. *The Journal of Philosophy*, 49(26), 797–815. doi:[10.2307/2020959](https://doi.org/10.2307/2020959)
- Bar, C. L. v. (1871). *Die lehre vom kausalzusammenhang im recht, besonders im strafrecht*. Verlag von Bernhard Tauchnitz.
- Barukčić, I. (1989). *Die Kausalität* (1. Aufl). Wiss.-Verl.
- Barukčić, I. (1997). *Die Kausalität* (2., völlig überarb. Aufl). Scientia.
- Barukčić, I. (2005). *Causality: New statistical methods*. Norderstedt, Germany: Books on Demand GmbH.
- Barukčić, I. (2011a). The Equivalence of Time and Gravitational Field. *Physics Procedia*, 22, 56–62. doi:[10.1016/j.phpro.2011.11.008](https://doi.org/10.1016/j.phpro.2011.11.008)
- Barukčić, I. (2011b). Anti heisenberg—refutation of heisenberg’s uncertainty relation. *AIP Conference Proceedings*, 1327(1), 322–325. doi:[10.1063/1.3567453](https://doi.org/10.1063/1.3567453)
- Barukčić, I. (2012). Anti-bell - refutation of bell’s theorem. *AIP Conference Proceedings*, 1508(1), 354–358. doi:[10.1063/1.4773147](https://doi.org/10.1063/1.4773147)
- Barukčić, I. (2013). The relativistic wave equation. *International Journal of Applied Physics and Mathematics*, 3(6), 387–391. doi:[10.7763/IJAPM.2013.V3.242](https://doi.org/10.7763/IJAPM.2013.V3.242)
- Barukčić, I. (2014a). Anti heisenberg – refutation of heisenberg’s uncertainty principle. *International Journal of Applied Physics and Mathematics*, 4(4), 244–250. doi:[10.7763/IJAPM.2014.V4.292](https://doi.org/10.7763/IJAPM.2014.V4.292)
- Barukčić, I. (2014b). Anti heisenberg – refutation of heisenberg’s uncertainty principle. *International Journal of Applied Physics and Mathematics*, 4(4), 244–250. doi:[10.7763/IJAPM.2014.V4.292](https://doi.org/10.7763/IJAPM.2014.V4.292)
- Barukčić, I. (2015). Anti einstein – refutation of einstein’s general theory of relativity. *International Journal of Applied Physics and Mathematics*, 5(1), 18–28. doi:[10.17706/ijapm.2015.5.1.18-28](https://doi.org/10.17706/ijapm.2015.5.1.18-28)
- Barukčić, I. (2016a). Anti chsh—refutation of the chsh inequality. *Journal of Applied Mathematics and Physics*, 4(44), 686–696. doi:[10.4236/jamp.2016.44079](https://doi.org/10.4236/jamp.2016.44079)

- Barukčić, I. (2016b). Anti heisenberg—the end of heisenberg’s uncertainty principle. *Journal of Applied Mathematics and Physics*, 4(55), 881–887. doi:[10.4236/jamp.2016.45096](https://doi.org/10.4236/jamp.2016.45096)
- Barukčić, I. (2016c). The geometrization of the electromagnetic field. *Journal of Applied Mathematics and Physics*, 4(1212), 2135–2171. doi:[10.4236/jamp.2016.412211](https://doi.org/10.4236/jamp.2016.412211)
- Barukčić, I. (2016d). Unified field theory. *Journal of Applied Mathematics and Physics*, 4(88), 1379–1438. doi:[10.4236/jamp.2016.48147](https://doi.org/10.4236/jamp.2016.48147)
- Barukčić, I. (2016e). The Mathematical Formula of the Causal Relationship k. *International Journal of Applied Physics and Mathematics*, 6(2), 45–65. doi:[10.17706/ijapm.2016.6.2.45-65](https://doi.org/10.17706/ijapm.2016.6.2.45-65)
- Barukčić, I. (2017a). *Die Kausalität* (Reprint 1989.). Books on Demand GmbH.
- Barukčić, I. (2017b). *Theoriae causalitatis principia mathematica* (First edition). Books on Demand GmbH.
- Barukčić, I. (2017c). Anti Bohr — Quantum Theory and Causality. *International Journal of Applied Physics and Mathematics*, 7(2), 93–111. doi:[10.17706/ijapm.2017.7.2.93-111](https://doi.org/10.17706/ijapm.2017.7.2.93-111)
- Barukčić, I. (2018a). Gastric Cancer and Epstein-Barr Virus Infection. *Modern Health Science*, 1(2), 1–18. doi:[10.30560/mhs.v1n2p1](https://doi.org/10.30560/mhs.v1n2p1)
- Barukčić, I. (2018b). Human Cytomegalovirus is the Cause of Glioblastoma Multiforme. *Modern Health Science*, 1(2), 19. doi:[10.30560/mhs.v1n2p19](https://doi.org/10.30560/mhs.v1n2p19)
- Barukčić, I. (2018c). Human Papillomavirus—The Cause of Human Cervical Cancer. *Journal of Biosciences and Medicines*, 06(04), 106–125. doi:[10.4236/jbm.2018.64009](https://doi.org/10.4236/jbm.2018.64009)
- Barukčić, I. (2018d). Zero divided by zero equals one. *Journal of Applied Mathematics and Physics*, 6(44), 836–853. doi:[10.4236/jamp.2018.64072](https://doi.org/10.4236/jamp.2018.64072)
- Barukčić, I. (2019a). *Die Kausalität* (Reprint 1997). Books on Demand.
- Barukčić, I. (2019b). Index of Independence. *Modern Health Science*, 2(2), 1–25. doi:[10.30560/mhs.v2n2p1](https://doi.org/10.30560/mhs.v2n2p1)
- Barukčić, I. (2019c). Index of Unfairness. *Modern Health Science*, 2(1), 22. doi:[10.30560/mhs.v2n1p22](https://doi.org/10.30560/mhs.v2n1p22)
- Barukčić, I. (2019d). Statins and death due to any cause – all doubts removed? *International Journal of Current Science Research*, 5(12), 1884–1911.
- Barukčić, I. (2019e). The P Value of likely extreme events. *International Journal of Current Science Research*, 5(11), 1841–1861.

- Barukčić, I. (2019f). Aristotle's law of contradiction and einstein's special theory of relativity. *Journal of Drug Delivery and Therapeutics*, 9(22), 125–143. doi:[10.22270/jddt.v9i2.2389](https://doi.org/10.22270/jddt.v9i2.2389)
- Barukčić, I. (2019g). Classical Logic And The Division By Zero. *International Journal of Mathematics Trends and Technology IJMTT*, 65(7), 31–73. doi:[10.14445/22315373/IJMTT-V65I8P506](https://doi.org/10.14445/22315373/IJMTT-V65I8P506)
- Barukčić, I. (2019h). The Interior Logic of Inequalities. *International Journal of Mathematics Trends and Technology IJMTT*, 65(7), 146–155. doi:<http://www.ijmtjournal.org/Volume-65/Issue-7/IJMTT-V65I7P524.pdf>
- Barukčić, I. (2020a). *N-th index D-dimensional Einstein gravitational field equations. Geometry unchained*. Books on Demand GmbH. Retrieved from <https://nbn-resolving.org/urn:nbn:de:101:1-2020112520101732772093>
- Barukčić, I. (2020b). *Zero and infinity mathematics without frontiers* (Second Edition). Books on Demand GmbH. Retrieved from <https://nbn-resolving.org/urn:nbn:de:101:1-2020032000184257989464>
- Barukčić, I. (2020c). Locality and non locality. *European Journal of Applied Physics*, 2(55). doi:[10.24018/ejphysics.2020.2.5.22](https://doi.org/10.24018/ejphysics.2020.2.5.22)
- Barukčić, I. (2020d). Glyphosate and Non-Hodgkin lymphoma: No causal relationship. *Journal of Drug Delivery and Therapeutics*, 10(1), 6–29. doi:[10.22270/jddt.v10i1-s.3856](https://doi.org/10.22270/jddt.v10i1-s.3856)
- Barukčić, I. (2020e). Causal relationship k. *International Journal of Mathematics Trends and Technology IJMTT*, 66(10), 76–115.
- Barukčić, I. (2021a). The logical content of the risk ratio. *Causation*, 16(4), 5–41. doi:[10.5281/zenodo.4679509](https://doi.org/10.5281/zenodo.4679509)
- Barukčić, I. (2021b). The causal relationship k. *MATEC Web of Conferences*, 336, 09032. doi:[10.1051/mateconf/202133609032](https://doi.org/10.1051/mateconf/202133609032)
- Barukčić, I., & Ufuoma, O. (2020). *Analysis of switching resistive circuits a method based on the unification of boolean and ordinary algebras* (First Edition). Books on Demand.
- Barukčić, J. P., & Barukčić, I. (2016). Anti aristotle—the division of zero by zero. *Journal of Applied Mathematics and Physics*, 4(44), 749–761. doi:[10.4236/jamp.2016.44085](https://doi.org/10.4236/jamp.2016.44085)
- Basharin, G. P., Langville, A. N., & Naumov, V. A. (2004). The life and work of a.a. markov. *Linear Algebra and its Applications*. Special Issue on the Conference on the Numerical Solution of Markov Chains 2003, 386, 3–26. doi:[10.1016/j.laa.2003.12.041](https://doi.org/10.1016/j.laa.2003.12.041)
- Bayes, T. (1763). LII. An essay towards solving a problem in the doctrine of chances. by the late Rev. Mr. Bayes, F. R. S. communicated by

- Mr. Price, in a letter to John Canton, A. M. F. R. S. *Philosophical Transactions of the Royal Society of London*, 53, 370–418. doi:[10.1098/rstl.1763.0053](https://doi.org/10.1098/rstl.1763.0053)
- Bell, J. S. (1964). On the einstein podolsky rosen paradox. *Physics*, 1(3), 195–200. doi:[10.1103/PhysicsPhysiqueFizika.1.195](https://doi.org/10.1103/PhysicsPhysiqueFizika.1.195)
- Bernoulli, J. (1713). *Ars conjectandi, Opus posthumus: Accedit Tractatus de seriebus infinitis ; et epistola Gallice scripta De Ludo Pilae Reticularis*. doi:[10.3931/e-rara-9001](https://doi.org/10.3931/e-rara-9001)
- Bernstein, S. N. (1926). Sur l'extension du théorème limite du calcul des probabilités aux sommes de quantités dépendantes. *Math. Annalen*, 97, 1–59. doi:[10.1007/BF01447859](https://doi.org/10.1007/BF01447859)
- Bettinger, A. K., & Englund, J. A. (1960). *Algebra And Trigonometry*. International Textbook Company.
- Bienaymé, I.-J. (1853). Considérations a l'appui de la découverte de Laplace sur la loi de probabilité dans la méthode des moindres carrés. *Comptes rendus des séances de l'Académie des Sciences des Paris*, 37, 309–324.
- Blalock, H. M. (1964). *Causal inferences in nonexperimental research*. Chapel Hill, NC: Univ. of North Carolina Press.
- Bobzien, S. (2002). The Development of Modus Ponens in Antiquity : From Aristotle to the 2nd Century AD. *Phronesis*, 47(4), 359–394. doi:[10.1163/156852802321016541](https://doi.org/10.1163/156852802321016541)
- Bocheński, J. M., & Menne, A. (1983). *Grundriß der formalen logik* (5. Aufl). UTB für Wissenschaft Uni-Taschenbücher Philosophie. Schöningh.
- Bohr, N. (1937). Causality and complementarity. *Philosophy of Science*, 4(3), 289–298. doi:[10.1086/286465](https://doi.org/10.1086/286465)
- Bohr, N. (1950). On the notions of causality and complementarity. *Science*, 111(2873), 51–54.
- Bombardier, C., Laine, L., Reicin, A., Shapiro, D., Burgos-Vargas, R., Davis, B., Day, R., Ferraz, M. B., Hawkey, C. J., Hochberg, M. C., Kvien, T. K., Schnitzer, T. J., & VIGOR Study Group. (2000). Comparison of upper gastrointestinal toxicity of rofecoxib and naproxen in patients with rheumatoid arthritis. VIGOR Study Group. *The New England Journal of Medicine*, 343(21), 1520–1528, 2 p following 1528. doi:[10.1056/NEJM200011233432103](https://doi.org/10.1056/NEJM200011233432103)
- Bombelli, R. (1579). *L' algebra : Opera di Rafael Bombelli da Bologna, divisa in tre libri : Con la quale ciascuno da se potrà venire in perfetta cognitione della teorica dell'Aritmetica : Con una tavola copiosa delle materie, che in essa si contengono*. Bolgna

- (Italy): per Giovanni Rossi. Retrieved February 14, 2019, from <http://www.e-rara.ch/doi/10.3931/e-rara-3918>
- Boole, G. (1854). *An investigation of the laws of thought, on which are founded the mathematical theories of logic and probabilities*. Walton and Maberly. Retrieved from <http://archive.org/details/investigationof00boolrich>
- Born, M. (1926). Zur Quantenmechanik der Stoßvorgänge. *Zeitschrift für Physik*, 37(12), 863–867. doi:10.1007/BF01397477
- Brans, C., & Dicke, R. H. (1961). Mach's principle and a relativistic theory of gravitation. *Physical Review*, 124, 925–935. doi:10.1103/PhysRev.124.925
- Bravais, A. (1846). Analyse mathématique sur les probabilités d es erreurs de situation d'un point. *Mémoires Présentées Par Divers Savants À L'Académie Royale Des Sciences De L'Institut De France*, 9, 255–332.
- Brian, D. (1996). *Einstein: A life*. New York, N.Y: J. Wiley.
- Bruno, G. (1583). *De la causa, principio et uno. translated into german: über die ursache, das prinzip und das eine* (Translation Reclam, Stuttgart 1986). Reclams Universal-Bibliothek. Unknown.
- Bundesgerichtshof für Strafsachen, B. (1951). *Entscheidungen des Bundesgerichtshofes*. Entscheidungen des Bundesgerichtshofes. Detmold: Carl Heymanns Verlag.
- Cantor, G. (1895). Beiträge zur begründung der transfiniten mengenlehre. *Mathematische Annalen*, 46, 481.
- Cargile, J., Horowitz, T., & Massey, G. J. (1994). *Thought Experiments in Science and Philosophy*. Publisher: unknown. Retrieved February 14, 2019, from <https://www.jstor.org/stable/2108510?origin=crossref>
- Carnielli, W. A., & Marcos, J. (2001). Ex contradictione non sequitur quodlibet. *Bulletin of Advanced Reasoning and Knowledge*, 7(1), 89–109.
- Carnielli, W., & Coniglio, M. E. (2016). *Paraconsistent logic: Consistency, contradiction and negation*. Springer Berlin Heidelberg.
- Carter, K. C. (1985). Koch's postulates in relation to the work of Jacob Henle and Edwin Klebs. *Medical History*, 29(4), 353–374. doi:10.1017/s0025727300044689
- Cartwright, N. (1979). Causal laws and effective strategies. *Noûs*, 13(4), 419–437. doi:10.2307/2215337
- Cartwright, N. (1983). *How the laws of physics lie*. Clarendon Press; Oxford University Press.

- Cartwright, N. (2002). Against modularity, the causal markov condition, and any link between the two: Comments on hausman and woodward. *The British Journal for the Philosophy of Science*, 53(3), 411–453.
- Cauchy, A. L. (1821). *Cours d'analyse de l'école royale polytechnique. première partie: Analyse algébrique*. chez Debure frères, Libraires du Roi et de la Bibliothèque du Roi. Retrieved from <https://doi.org/10.3931/e-rara-26182>
- Chairman, M. H., Hartley, H. O., & Hoel, P. G. (1965). Recommended standards for statistical symbols and notation. *The American Statistician*, 19(3), 12–14. doi:10.1080/00031305.1965.10479727
- Chignell, A., & Pereboom, D. (2010). Kant's theory of causation and its eighteenth-century german background. *The Philosophical Review*, 119(4), 565–591.
- Clauser, J. F., Horne, M. A., Shimony, A., & Holt, R. A. (1969). Proposed experiment to test local hidden-variable theories. *Physical Review Letters*, 23(15), 880–884. doi:10.1103/PhysRevLett.23.880
- Cornfield, J. (1951). A method of estimating comparative rates from clinical data; applications to cancer of the lung, breast, and cervix. *Journal of the National Cancer Institute*, 11(6), 1269–1275.
- Cotes, R., & Halley, E. (1714). Logometria. *Philosophical Transactions of the Royal Society of London*, 29(338), 5–45. Publisher: Royal Society. doi:10.1098/rstl.1714.0002
- da Costa, N. C. A. [Newton C. A.]. (1974). On the theory of inconsistent formal systems. *Notre Dame Journal of Formal Logic*, 15(4), 497–510. doi:10.1305/ndjfl/1093891487
- da Costa, N. C. A. [Newton Carneiro Alfonso]. (1958). Nota sobre o conceito de contradição. *Anuário da Sociedade Paranaense de Matemática*, 1(2), 6–8. Retrieved from [Portuguese](#)
- Davis, C. (1962). The norm of the schur product operation. *Numerische Mathematik*, 4(1), 343–344. doi:10.1007/BF01386329
- Dawid, A. P. (2000). Causal inference without counterfactuals. *Journal of the American Statistical Association*, 95(450), 407–424. doi:10.1080/01621459.2000.10474210
- DeGroot, M. H., & Schervish, M. J. (2005). *Probability and statistics* (Third Edition). Ministry of Education of the People's Republic of China - Higher Education Press.
- Donnelly, J. (1970). Creation ex nihilo. *Proceedings of the American Catholic Philosophical Association*, 44, 172–184. doi:10.5840/acpapro19704425

- Drude, P. (1894). Zum Studium des elektrischen Resonators. *Annalen der Physik und Chemie*, 53(3), 721–768.
- Dubarle, D. (1972). *Logique et dialectique*. Librairie Larousse. Retrieved from <http://archive.org/details/logiqueetdialect0000duba>
- Earman, J. (1986). *A primer on determinism*. University of Western Ontario series in philosophy of science. D. Reidel Pub. Co.; Sold, distributed in the U.S.A., and Canada by Kluwer Academic.
- Easwaran, K. (2008). The Role of Axioms in Mathematics. *Erkenntnis*, 68(3), 381–391. doi:10.1007/s10670-008-9106-1
- Edgeworth, F. Y. (1892). Xxii. correlated averages. *The London, Edinburgh, and Dublin Philosophical Magazine and Journal of Science*, 34(207), 190–204. doi:10.1080/14786449208620307
- Eells, E. (1991). *Probabilistic causality*. Cambridge Studies in Probability, Induction and Decision Theory. Cambridge University Press.
- Efron, B. (1998). R. A. Fisher in the 21st century (Invited paper presented at the 1996 R. A. Fisher Lecture). *Statistical Science*, 13(2), 95–122. Publisher: Institute of Mathematical Statistics. doi:10.1214/ss/1028905930
- Ehrhardt, A. (1950). Creatio ex nihilo. *Studia Theologica - Nordic Journal of Theology*, 4(1), 13–43. doi:10.1080/00393385008599697
- Einstein, A. [A.]. (1948). Quanten-Mechanik Und Wirklichkeit. *Dialectica*, 2(3-4), 320–324. doi:10.1111/j.1746-8361.1948.tb00704.x
- Einstein, A. [Albert]. (1905). Zur elektrodynamik bewegter körper. *Annalen der Physik*, 322(10), 891–921. doi:<https://doi.org/10.1002/andp.19053221004>
- Einstein, A. [Albert]. (1915). Die Feldgleichungen der Gravitation. *Sitzungsberichte der Königlich Preußischen Akademie der Wissenschaften (Berlin)*, Seite 844-847. Retrieved February 12, 2019, from <http://adsabs.harvard.edu/abs/1915SPAW.....844E>
- Einstein, A. [Albert]. (1916). Die grundlage der allgemeinen relativitätstheorie. *Annalen der Physik*, 354(7), 769–822. doi:<https://doi.org/10.1002/andp.19163540702>
- Einstein, A. [Albert]. (1917). Kosmologische betrachtungen zur allgemeinen relativitätstheorie. *Sitzungsberichte der Königlich Preußischen Akademie der Wissenschaften (Berlin)*, 142–152.
- Einstein, A. [Albert]. (1919). Induktion and Deduktion in der Physik. *Berliner Tageblatt and Handelszeitung*, Suppl. 4. Retrieved from <https://einsteinpapers.press.princeton.edu/vol7-trans/124>

- Einstein, A. [Albert]. (1921). *Geometrie und erfahrung. erweiterte fassung des festvortrages gehalten an der preussischen akademie der wissenschaften zu berlin am 27. januar 1921*. Julius Springer. Retrieved from <https://doi.org/10.1007/978-3-642-49903-6>
- Einstein, A. [Albert]. (1923). *The meaning of relativity. Four lectures delivered at Princeton University, May, 1921*. Princeton: Princeton University Press.
- Einstein, A. [Albert]. (1935a). *The world as i see it* (A. Harris, Ed.). John Lane, The Bodley Head.
- Einstein, A. [Albert]. (1935b). Elementary Derivation of the Equivalence of Mass and Energy. *Bulletin of the American Mathematical Society*, 41(4), 223–230. Retrieved from https://projecteuclid.org/download/pdf_1/euclid.bams/1183498131
- Einstein, A. [Albert], Podolsky, B., & Rosen, N. (1935). Can quantum-mechanical description of physical reality be considered complete? *Physical Review*, 47(10), 777–780. doi:10.1103/PhysRev.47.777
- Einstein, A. [Albert], & Sitter, W. d. (1932). On the Relation between the Expansion and the Mean Density of the Universe. *Proceedings of the National Academy of Sciences of the United States of America*, 18(3), 213–214. Retrieved February 12, 2019, from <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC1076193/>
- Engels, F. (1987). *Anti-Dühring: Dialectics of Nature*. Collected Works. International Publisher.
- Euclid, o. A. (B. (1893). *Euclids elements of geometry* (H. M. Taylor, Ed.). Cambridge [Cambridgeshire] : at the University Press.
- Euler, L. (1748). *Introductio in analysin infinitorum*. doi:10.3931/e-rara-8740
- Euler, L. (1771). *Vollständige anleitung zur algebra. erster theil*. Bei der kayserschen Akademie der Wissenschaften. Retrieved from <https://doi.org/10.3931/e-rara-9093>
- Fichte, J. G. (1889). *Science of knowledge*. The english and foreign philosophical library. London: Trübner & Co.
- Finsler, P. (1918). *Über Kurven und Flächen in allgemeinen Räumen* (Doctoral dissertation, Georg-August Universität, Göttingen).
- Fisher, R. A. (1912). On an absolute criterion for fitting frequency curves. *Messenger of Mathematics*.
- Fisher, R. A. (1915). Frequency distribution of the values of the correlation coefficient in samples from an indefinitely large population. *Biometrika*, 10(4), 507–521. doi:10.2307/2331838

- Fisher, R. A. (1918). XV.—The Correlation between Relatives on the Supposition of Mendelian Inheritance. *Transactions of The Royal Society of Edinburgh*, 52(2), 399–433. Publisher: Royal Society of Edinburgh Scotland Foundation. doi:[10.1017/S0080456800012163](https://doi.org/10.1017/S0080456800012163)
- Fisher, R. A. (1922). On the Interpretation of Chi square from Contingency Tables, and the Calculation of P. *Journal of the Royal Statistical Society*, 85(1), 87–94. doi:[10.2307/2340521](https://doi.org/10.2307/2340521)
- Fisher, R. A. (1926). The arrangement of field experiments. *Journal of the Ministry of Agriculture*, 33, 503–515. doi:[10.23637/rothamsted.8v61q](https://doi.org/10.23637/rothamsted.8v61q)
- Fisher, R. A. (1930). *The genetical theory of natural selection*. The genetical theory of natural selection. doi:[10.5962/bhl.title.27468](https://doi.org/10.5962/bhl.title.27468)
- Fisher, R. A. (1935). The logic of inductive inference. *Journal of the Royal Statistical Society*, 98(1), 39–82. doi:[10.2307/2342435](https://doi.org/10.2307/2342435)
- FitzGerald, G. F. (1889). The ether and the earth's atmosphere. *Science (New York, N.Y.)* 13(328), 390. doi:[10.1126/science.ns-13.328.390](https://doi.org/10.1126/science.ns-13.328.390)
- Ford, L. S. (1983). An alternative to creatio ex nihilo. *Religious Studies*, 19(2), 205–213. doi:[10.1017/S0034412500015031](https://doi.org/10.1017/S0034412500015031)
- Förster, E., & Melamed, Y. Y. (2012). *Omnis determinatio est negatio—Determination, Negation and Self-Negation in Spinoza, Kant, and Hegel*. In: *Spinoza and German idealism*. Eckart Forster & Yitzhak Y. Melamed (eds.) OCLC: 815970158. Cambridge [England]; New York: Cambridge University Press. Retrieved December 5, 2019, from <https://doi.org/10.1017/CBO9781139135139>
- Friedman, M. (2008). Einstein, kant, and the a priori*. *Royal Institute of Philosophy Supplements*, 63, 95–112. doi:[10.1017/S1358246108000064](https://doi.org/10.1017/S1358246108000064)
- Galton, F. (1877). Typical Laws of Heredity. *Nature*, 15(388), 492–495. doi:[10.1038/015492a0](https://doi.org/10.1038/015492a0)
- Galton, F. (1888). Co-relations and their measurement, chiefly from anthropometric data. *Proceedings of the Royal Society of London*, 45, 135–145.
- Gauss, C. F. (1809). *Theoria motus corporum coelestium in sectionibus conicis solem ambientum*. sumtibus Frid. Perthes et I. H. Besser. Retrieved from <http://www.e-rara.ch/doi/10.3931/e-rara-522>
- Gauss, C. F. (1823). *Theoria combinationis observationum erroribus minimis obnoxiae*. apud Henricum Dieterich.
- Geeraerts, D. (1986). On necessary and sufficient conditions. *Journal of Semantics*, 5(4), 275–291. doi:[10.1093/jos/5.4.275](https://doi.org/10.1093/jos/5.4.275)

- Geyser, G. J. A. M. (1915). *Allgemeine philosophie des seins und der natur*. Ferdinand Schöningh.
- Glynn, L. (2010). A probabilistic analysis of causation. *The British Journal for the Philosophy of Science*, 62(2), 343–392. Accepted: 2011-10-19T07:07:50Z. doi:[10.1093/bjps/axq015](https://doi.org/10.1093/bjps/axq015)
- Gödel, K. (1931). Über formal unentscheidbare sätze der principia mathematica und verwandter systeme i. *Monatshefte für Mathematik und Physik*, 38(1), 173–198. doi:[10.1007/BF01700692](https://doi.org/10.1007/BF01700692)
- Gödel, K. (1932). Zum intuitionistischen Aussagenkalkül. *Anzeiger Akademie Der Wissenschaften Wien*, 69, 65–66.
- Goenner, H. (2012). Some remarks on the genesis of scalar-tensor theories. *General Relativity and Gravitation*, 44(8), 2077–2097. doi:[10.1007/s10714-012-1378-8](https://doi.org/10.1007/s10714-012-1378-8)
- Goethe, J. W. v. (1808). *Faust. eine tragödie*. (1. Auflage). J. G. Cotta. Retrieved from https://de.wikipedia.org/wiki/Datei:Goethe_Faust_I_1808.jpg
- Gomes, G. (2009). Are necessary and sufficient conditions converse relations? *Australasian Journal of Philosophy*, 87(3), 375–387. doi:[10.1080/00048400802587325](https://doi.org/10.1080/00048400802587325)
- Gonin, H. T. (1936). XIV. The use of factorial moments in the treatment of the hypergeometric distribution and in tests for regression. *The London, Edinburgh, and Dublin Philosophical Magazine and Journal of Science*, 21(139), 215–226. doi:[10.1080/14786443608561573](https://doi.org/10.1080/14786443608561573)
- Good, I. J. (1959). A theory of causality. *The British Journal for the Philosophy of Science*, 9(36), 307–310. doi:[10.1093/bjps/IX.36.307](https://doi.org/10.1093/bjps/IX.36.307)
- Gosset, W. S. (1908). The probable error of a mean. *Biometrika*, 6(1), 1–25. doi:[10.2307/2331554](https://doi.org/10.2307/2331554)
- Greenwood, M., & Yule, G. U. [G. Udny]. (1915). The statistics of anti-typhoid and anti-cholera inoculations, and the interpretation of such statistics in general. *Proceedings of the Royal Society of Medicine*, 8, 113–194. doi:[10.1177/003591571500801433](https://doi.org/10.1177/003591571500801433)
- Hadamard, J. (1893). Résolution d'une question relative aux déterminants. *Bulletin des Sciences Mathématiques*, 2(17), 240–246.
- Haldane, J. B. S. (1957). Karl Pearson, 1857-1957. Being a Centenary Lecture. *Biometrika*, 44(3/4), 303–313. doi:[10.2307/2332863](https://doi.org/10.2307/2332863)
- Hansemann, D. P. v. (1912). *Über das konditionale Denken in der Medizin und seine Bedeutung für die Praxis*. Berlin.: Hirschwald.

- Hausman, D. M., & Woodward, J. (1999). Independence, invariance and the causal markov condition. *The British Journal for the Philosophy of Science*, 50(4), 521–583. doi:10.1093/bjps/50.4.521
- Hedwig, K. (1980). Negatio negationis: Problemgeschichtliche aspekte einer denkstruktur. *Archiv für Begriffsgeschichte*, 24(1), 7–33.
- Hegel, G. W. F. (1812). *Wissenschaft der logik. erster band. die objektive logik* (1. Auflage). bey Johann Leonhard Schrag. Retrieved from https://www.deutschestextarchiv.de/book/show/hegel_logik0101_1812
- Hegel, G. W. F. (1813). *Wissenschaft der logik. erster band. die objektive logik. zweytes buch: Die lehre vom wesen* (1. Auflage). bey Johann Leonhard Schrag. Retrieved from https://www.deutschestextarchiv.de/book/show/hegel_logik0102_1813
- Hegel, G. W. F. (1816). *Wissenschaft der logik. zweiter band. die subjective logik oder lehre vom begriff* (1. Auflage). bey Johann Leonhard Schrag. Retrieved from https://www.deutschestextarchiv.de/book/show/hegel_logik02_1816
- Hegel, G. W. F. (1998). *Hegel's science of logic. transl. by a. v. miller. edited by h. d. lewis* (A. V. Miller, Ed.). Humanity Books.
- Heinemann, F. H. (1943). The meaning of negation. *Proceedings of the Aristotelian Society*, 44, 127–152.
- Heisenberg, W. (1931). Kausalgesetz und quantenmechanik. *Erkenntnis*, 2, 172–182.
- Heisenberg, W. K. (1927). Über den anschaulichen inhalt der quantentheoretischen kinematik und mechanik. *Zeitschrift für Physik*, 43(3), 172–198. doi:10.1007/BF01397280
- Helmert, F. R. (1876). Über die Wahrscheinlichkeit der Potenzsummen der Beobachtungsfehler und über einige damit im Zusammenhange stehende Fragen. *Zeitschrift für Mathematik und Physik*, 21(3), 102–219.
- Henle, F. G. J. (1840). *Von den Miasmen und Contagien und von den miasmatisch-contagiösen Krankheiten*. Berlin: Verlag von August Hirschwald. Retrieved from <https://doi.org/10.11588/diglit.15175>
- Hess, K., De Raedt, H., & Khrennikov, A. (2017). Special Issue: Ever New “Loopholes” in Bell’s Argument and Experimental Tests. *Open Physics*, 15(1), 572–576. doi:10.1515/phys-2017-0067
- Hessen, J. (1928). *Das kausalprinzip*. Verlegt bei Benno Filser.
- Hesslow, G. (1976). Two notes on the probabilistic approach to causality. *Philosophy of Science*, 43(2), 290–292.

- Hesslow, G. (1981). Causality and determinism. *Philosophy of Science*, 48(4), 591–605. doi:[10.1086/289023](https://doi.org/10.1086/289023)
- Heyden, G. (1962). Das gesetz. *Deutsche Zeitschrift für Philosophie*, 10(3), 357–372. doi:[10.1524/dzph.1962.10.3.357](https://doi.org/10.1524/dzph.1962.10.3.357)
- Hilbert, D. (1917). Axiomatisches Denken. *Mathematische Annalen*, 78(1), 405–415. doi:[10.1007/BF01457115](https://doi.org/10.1007/BF01457115)
- Hill, A. B. (1965). The environment and disease: Association or causation? *Proceedings of the Royal Society of Medicine*, 58, 295–300.
- Hochheim, M. E. v. (1986). *Meister eckhart. deutsche werke band 1: Predigten* (Unveränd. Nachdr. d. 1. Aufl. Stuttgart 1958). Die deutschen und lateinischen Werke Die deutschen Werke. Kohlhammer.
- Hofer, C. (2004). Causality and determinism: Tension, or outright conflict? Forthcoming in spanish journal Revista de Filosofía. Retrieved from <http://philsci-archive.pitt.edu/2071/>
- Höfding, W. (1940). *Maßstabinvariante korrelationstheorie* (Doctoral dissertation, Friedrich-Wilhelms-Universität Berlin).
- Holbach, P. H. T. d. (1780). *Système de la nature, ou des lois du monde physique et du monde moral*. par Mirabaud. Retrieved from <https://doi.org/10.3931/e-rara-14756>
- Holik, F., Massri, C., & Plastino, A. (2016). Geometric probability theory and jaynes's methodology. *International Journal of Geometric Methods in Modern Physics*, 13(03), 1650025. doi:[10.1142/S0219887816500250](https://doi.org/10.1142/S0219887816500250)
- Horn, L. R. (1989). *A natural history of negation*. University of Chicago Press. Retrieved from <https://emilkirkegaard.dk/en/wp-content/uploads/A-natural-history-of-negation-Laurence-R.-Horn.pdf>
- Hörz, Herbert. (1974). Das Verhältnis von Kausalität und Gesetz in der Physik. *Deutsche Zeitschrift für Philosophie*, 22(8), 954–967. doi:[10.1524/dzph.1974.22.8.954](https://doi.org/10.1524/dzph.1974.22.8.954)
- Hotelling, H. (1930). The consistency and ultimate distribution of optimum statistics. *Transactions of the American Mathematical Society*, 32(4), 847–859. doi:[10.2307/1989353](https://doi.org/10.2307/1989353)
- Hu, D. (2009). *China and albert einstein: The reception of the physicist and his theory in china, 1917-1979*. Harvard University Press. Retrieved from <https://doi.org/10.4159/9780674038882>
- Huber, F. (2011). Lewis causation is a special case of spohn causation. *The British Journal for the Philosophy of Science*, 62(1), 207–210. doi:[10.1093/bjps/axq030](https://doi.org/10.1093/bjps/axq030)

- Hume, D. (1739). *A treatise of human nature: Being an attempt to introduce the experimental method of reasoning into moral subjects*. John Noon. Retrieved from https://ia802605.us.archive.org/14/items/treatiseofhumann00hume_0/treatiseofhumann00hume_0.pdf
- Hume, D. (1748). *An enquiry concerning human understanding*. The Open court publishing co. Retrieved from <https://archive.org/details/enquiryconcernin01hume>
- Huygens, C., & van Schooten, F. (1657). *De ratiociniis in ludo alae: In: Exercitationum mathematicarum liber primus [- quintus]*. doi:10.3931/e-rara-8813
- Israël, H. (2011). *Hundert autoren gegen einstein*. Alo austrian literature online.
- Justice Matthews, M. (1884). *Hayes v. Michigan Central R. Co.*, 111 U.S. 228. *U. S. Supreme Court*. Retrieved from <https://supreme.justia.com/cases/federal/us/111/228/>
- Kant, I. (1770). *De mundi sensibilis atque intelligibilis forma et principiis. dissertatio pro loco*. University of Königsberg. Retrieved from <http://dx.doi.org/10.3931/e-rara-24887>
- Kant, I. (1783). *Prolegomena zu einer jeden künftigen metaphysik die als wissenschaft wird auftreten können*. doi:10.3931/e-rara-25000
- Kant, I. (1790). *Critic der reinen vernunft* (Dritte unveränderte Auflage). Verlag von Johann Friedrich Hartknoch.
- Kant, I. (1894). *De mundi sensibilis atque intelligibilis forma et principiis (kant's inaugural dissertation of 1770 translated by william julius eckoff)*. Columbia College 1894. Retrieved from <http://archive.org/details/cu31924029022329>
- Kant, I. (1919). *Kritik der reinen vernunft* (11. Auflage). Philosophische Bibliothek. Verlag von Felix Meiner.
- Kant, I. (1929). *Immanuel kant's critique of pure reason*. Macmillan and Company Limited.
- Kant, I. (2004). *Prolegomena to any future metaphysics that will be able to come forward as science* (Rev. ed). Cambridge texts in the history of philosophy. Cambridge University Press.
- Kay, D. C. (1988). *Schaum's outline of theory and problems of tensor calculus*. Schaum's outline series. Schaum's outline series in mathematics. New York: McGraw-Hill.
- Kemeny, J. G., Snell, J. L., & Knapp, A. W. (1976). *Denumerable Markov chains* (2. ed). Graduate texts in mathematics. Springer.

- Retrieved from http://archive.org/details/springer_10.1007-978-1-4684-9455-6
- Khrennikov, A. (2012). Växjö interpretation of wave function: 2012. (pp. 244–252). doi:[10.1063/1.4773136](https://doi.org/10.1063/1.4773136)
- Kienle, G. S. (2020). Cum hoc, ergo propter hoc. *BMJ*.
- Klain, D. A., & Rota, G.-C. (1997). *Introduction to geometric probability*. Lezioni lincee. Cambridge University Press.
- Knuth, D. E. (1992). Two notes on notation. *The American Mathematical Monthly*, 99(5), 403–422. doi:[10.1080/00029890.1992.11995869](https://doi.org/10.1080/00029890.1992.11995869)
- Koch, A. F. (1999). Die Selbstbeziehung der Negation in Hegels Logik. *Zeitschrift für philosophische Forschung*, 53(1), 1–29. Retrieved December 5, 2019, from www.jstor.org/stable/20484868
- Koch, R. (1878). Neue Untersuchungen über die Mikroorganismen bei infektiösen Wundkrankheiten. *Deutsche Medizinische Wochenschrift*, 4(43), 531–533. doi:<http://dx.doi.org/10.25646/5067>
- Kolmogoroff, A. N. (1933). *Grundbegriffe der Wahrscheinlichkeitsrechnung (reprint 1973)*. doi:[10.1007/978-3-642-49888-6](https://doi.org/10.1007/978-3-642-49888-6)
- Kolmogoroff, A. N. (1950). *Foundations of the theory of probability* (First English Edition. Translated by Nathan Morrison). New York: Chelsea Publishing Company.
- Korch, H. (1965). *Das Problem der Kausalität*. Berlin: Dt. Verlag der Wissenschaften.
- Krancberg, S. (1981). The “science of logic” in soviet philosophy and a reading in hegelian dialectics. *Studies in Soviet Thought*, 22(2), 83–109.
- Kröber, Günter. (1962). ÜBER DIE ROLLE DER BEDINGUNGEN FÜR DAS WIRKEN OBJEKTIVER GESETZE. *Deutsche Zeitschrift für Philosophie*, 10(10), 1261–1277. doi:[10.1524/dzph.1962.10.10.1261](https://doi.org/10.1524/dzph.1962.10.10.1261)
- Kröber, G. (1961a). A. i. ujomow: Über das zeitliche verhältnis zwischen ursache und wirkung. *Deutsche Zeitschrift für Philosophie*, 9(4), 523.
- Kröber, G. (1961b). Der Konditionalismus und seine Kritik in der sowjetischen Wissenschaft. *Wissenschaftliche Zeitschrift der Karl-Marx Universität Leipzig*, 10(2), 137–153.
- Kröber, G. (1962). Über die Rolle der Bedingungen für das Wirken objektiver Gesetze. *Deutsche Zeitschrift für Philosophie*, 10(10), 1261–1277. doi:[10.1524/dzph.1962.10.10.1261](https://doi.org/10.1524/dzph.1962.10.10.1261)

- Kunen, K. (1987). Negation in logic programming. *The Journal of Logic Programming*, 4(4), 289–308. doi:10.1016/0743-1066(87)90007-0
- Laplace, P. S. d. (1814). *Essai philosophique sur les probabilités*. Mme Ve Courcier. Retrieved from <https://doi.org/10.3931/e-rara-3684>
- Larmor, J. (1897). IX. a dynamical theory of the electric and luminiferous medium.— Part III. relations with material media. *Philosophical Transactions of the Royal Society of London. Series A, Containing Papers of a Mathematical or Physical Character*, 190, 205–300. doi:10.1098/rsta.1897.0020
- Lee, E. T., & Zadeh, L. A. (1969). Note on fuzzy languages. *Information Sciences*, 1(4), 421–434. doi:10.1016/0020-0255(69)90025-5
- Leibniz, G. W. (1690). De causa gravitatis et defensio sententiae autoris de veris naturae legibus contra cartesianos. *Acta Eruditorum*, 228–239.
- Leibniz, G. W. (1765a). *Nouveaux essais sur l'entendement humain*. Oeuvres philosophiques latines & françoises de feu Mr. de Leibnitz. Chez Jean Schreuder. Retrieved from https://www.uni-muenster.de/Leibniz/DatenVI6/A_VI_6.pdf
- Leibniz, G. W. (1765b). *Oeuvres philosophiques latines & françoises de feu Mr. de Leibnitz*. Amsterdam (NL): Chez Jean Schreuder. Retrieved January 16, 2019, from <https://archive.org/details/oeuvresphilosoph00leibuoft/page/n9>
- Leibniz, G. W. F. v. (1703). Explication de l'arithmétique binaire, qui se sert des seuls caractères O et I avec des remarques sur son utilité et sur ce qu'elle donne le sens des anciennes figures chinoises de Fohy. *Mémoires de mathématique et de physique de l'Académie royale des sciences*. Retrieved February 20, 2019, from <https://hal.archives-ouvertes.fr/ads-00104781>
- Lekschas, J., Beckert, R., & Schröder, R. (1982). Kausalitätsprüfung im strafrecht. *Neue Justiz*, 6, 252.
- Leon Brillouin. (1946). *Wave Propagation In Periodic Structures Electric Filters And Crystal Lattices First Edition*. New York (USA): Mcgraw-hil Book Company, Inc. Retrieved October 4, 2020, from <http://archive.org/details/in.ernet.dli.2015.166889>
- Lesser, H. (1965). Das zeitliche verhältnis von ursache und wirkung. *Deutsche Zeitschrift für Philosophie*, 13(3), 321–335. doi:10.1524/dzph.1965.13.3.321

- Lewis, D. (1986). Postscripts to 'causation'. In D. Lewis (Ed.), *Philosophical papers* (Vol. Volume II, pp. 172–213). Oxford University Press.
- Lewis, D. K. (1973). *Counterfactuals*. Harvard University Press.
- Lewis, D. K. (1974). Causation. *The Journal of Philosophy*, 70(17), 556–567. doi:[10.2307/2025310](https://doi.org/10.2307/2025310)
- Lewis, G. N., & Tolman, R. C. (1909). LVII. The principle of relativity, and non-newtonian mechanics. *The London, Edinburgh, and Dublin Philosophical Magazine and Journal of Science*, 18(106), 510–523. doi:[10.1080/14786441008636725](https://doi.org/10.1080/14786441008636725)
- Libbrecht, U. (2005). *Chinese mathematics in the thirteenth century: the Shu-shu chiu-chang of Ch'in Chiu-shao* (Dover ed). Dover Publications.
- Libri, G. (1833). Mémoire sur les fonctions discontinues. *Journal für die reine und angewandte Mathematik*, 10, 303–316.
- Lorentz, H. A. (1892). De relatieve beweging van de aarde en den aether. *Verslagen der Afdeeling Natuurkunde van de Koninklijke Akademie van Wetenschappen*, 1, 74–79.
- Lorentz, H. A. (1899). Simplified theory of electrical and optical phenomena in moving systems. *Verhandelingen der Koninklijke Akademie van Wetenschappen*, 1, 427–442.
- Łukasiewicz, J. (1920). O logice trójwartościowej. *Ruch Filozoficzny*, 5, 170–171.
- Łukasiewicz, J., & Tarski, A. (1930). Untersuchungen über den Aussagenkalkül. *Comptes Rendus des Séances de la Société des Sciences et des Lettres de Varsovie, Class III*, 23, 30–50.
- Lukasiewicz, J., & Wedin, V. (1971). On the principle of contradiction in aristotle. *The Review of Metaphysics*, 24(3), 485–509.
- Mackie, J. L. (1965). Causes and Conditions. *American Philosophical Quarterly*, 2(4), 245–264. Retrieved February 3, 2019, from <https://www.jstor.org/stable/20009173>
- Maor, E. (2007). *The Pythagorean Theorem: A 4,000-Year History*. Princeton University Press. Retrieved October 2, 2020, from <https://www.jstor.org/stable/j.ctvh9w0ks>
- Markov, A. A. (1906). Rasprostranenie zakona bol'shih chisel na velichiny, zavisyaschie drug ot drugar. *Izvestiya Fiziko - matematicheskogo otdeleniya pri Kazanskom universitete*, 15(94), 135–156.

- Marx, K. (1867). *Das Kapital. Kritik der politischen Oekonomie. Erster Band. Buch I: Der Produktionsprozess des Kapitals*. (1. Auflage) (F. Engels, Ed.). Verlag von Otto Meissner.
- Maxwell, J. C. (1867). On governors. *Proceedings of Royal Society of London*, 16(100), 270–283. doi:[10.1098/rspl.1867.0055](https://doi.org/10.1098/rspl.1867.0055)
- McCluskey, E. J. (1956). Minimization of boolean functions*. *Bell System Technical Journal*, 35(6), 1417–1444. doi:[10.1002/j.1538-7305.1956.tb03835.x](https://doi.org/10.1002/j.1538-7305.1956.tb03835.x)
- Menger, K. (2003). Probabilistic geometry. In K. Menger, B. Schweizer, A. Sklar, K. Sigmund, P. Gruber, E. Hlawka, L. Reich, & L. Schmetterer (Eds.), *Selecta mathematica: Volume 2* (pp. 441–444). doi:[10.1007/978-3-7091-6045-9_37](https://doi.org/10.1007/978-3-7091-6045-9_37)
- Menzies, P. (1989). Probabilistic causation and causal processes: A critique of lewis. *Philosophy of Science*, 56(4), 642–663. doi:[10.1086/289518](https://doi.org/10.1086/289518)
- Mill, J. S. (1843). *A system of logic, ratiocinative and inductive: Being a connected view of the principles of evidence, and methods of scientific investigation*. J. W. Parker.
- Milman, V. D. (2008). Geometrization of probability. In M. Kapranov, Y. I. Manin, P. Moree, S. Kolyada, & L. Potyagailo (Eds.), *Geometry and dynamics of groups and spaces: In memory of alexander reznikov* (pp. 647–667). Progress in Mathematics. doi:[10.1007/978-3-7643-8608-5_15](https://doi.org/10.1007/978-3-7643-8608-5_15)
- Mises, R. v. (1930). Über kausale und statistische Gesetzmäßigkeit in der physik. *Erkenntnis*, 1, 189–210.
- Misner, C. W., Thorne, K. S., & Wheeler, J. A. (1973). *Gravitation*. W. H. Freeman.
- Mittasch, A. (1940). Entwicklung des physikalischen Kausalschemas bis Julius Robert Mayer. In A. Mittasch (Ed.), *Julius Robert Mayers Kausalbegriff: Seine geschichtliche Stellung, Auswirkung und Bedeutung* (pp. 23–33). doi:[10.1007/978-3-642-94438-3_3](https://doi.org/10.1007/978-3-642-94438-3_3)
- Moivre, A. d. (1718). *The Doctrine of Chances or a Method of Calculating the Probability of Events in Play*. doi:[10.3931/e-rara-10420](https://doi.org/10.3931/e-rara-10420)
- Moivre, A. d. (1733). *Approximatio ad summam terminorum binomii (a+b)n in seriem expansi*. Private (Publisher not identified). Retrieved from <https://www.york.ac.uk/depts/maths/histstat/demoivre.pdf>
- Morabia, A. (2004). *A history of epidemiologic methods and concepts*. Birkhauser Verlag.
- Neffe, J. (2007). *Einstein: A biography*. Polity Press.

- Newstadt, R. (2015). *Omnis determinatio est negatio: A genealogy and defense of the hegelian conception of negation* (Dissertation). Loyola University Chicago. Retrieved from http://ecommons.luc.edu/luc_diss/1481
- Newton, I. (1687). *Philosophiae naturalis principia mathematica*. Londini: Jussu Societatis Regiae ac Typis Josephi Streater. Prostat apud plures bibliopolas. Retrieved February 12, 2019, from <http://dx.doi.org/10.3931/e-rara-440>
- Newton, I. (1744). *Opuscula mathematica, philosophica et philologica. Collegit partimque latine vertit ac recensuit Joh. Castillioneus*. Lausanne & Genève: apud Marcum-Michaellem Bousquet & socios. Retrieved January 16, 2019, from <http://doi.org/10.3931/e-rara-8608>
- Neyman, J., & Pearson, E. S. (1933). IX. on the problem of the most efficient tests of statistical hypotheses. *Philosophical Transactions of the Royal Society of London. Series A, Containing Papers of a Mathematical or Physical Character*, 231(694–706), 289–337. doi:10.1098/rsta.1933.0009
- Noordhof, P. J. P. (1999). Probabilistic causation, preemption and counterfactuals. *Mind*, 108(429), 95–125. doi:10.1093/mind/108.429.95
- Nordström, G. (1913). Zur theorie der gravitation vom standpunkt des relativitätsprinzips. *Annalen der Physik*, 347, 533–554. doi:10.1002/andp.19133471303
- Norton, J. D. (1992). Einstein, nordström and the early demise of scalar, lorentz-covariant theories of gravitation. *Archive for History of Exact Sciences*, 45(1), 17–94. doi:10.1007/BF00375886
- Okun, L. B. (2008). The theory of relativity and the pythagorean theorem. *Physics-Uspekhi*, 51(6), 622.
- Pacioli, L. (1494). *Summa de arithmetica, geometria, proportioni et proportionalità*. Venice: Unknown publisher. Retrieved February 16, 2019, from <http://doi.org/10.3931/e-rara-9150>
- Pagano, M. (2018). *Principles of biostatistics*. Taylor & Francis.
- Pais, A. (1979). Einstein and the quantum theory. *Reviews of Modern Physics*, 51(4), 863–914. doi:10.1103/RevModPhys.51.863
- Peano, G. (1889). *Arithmetices principia: Nova methodo*. Fratres Bocca.
- Pearl, J. (2000). *Causality: Models, reasoning, and inference*. Cambridge University Press.
- Pearson, K. (1896). VII. Mathematical contributions to the theory of evolution.—III. Regression, heredity, and panmixia. *Philosophical*

- Transactions of the Royal Society of London. Series A, Containing Papers of a Mathematical or Physical Character*, 187, 253–318. doi:[10.1098/rsta.1896.0007](https://doi.org/10.1098/rsta.1896.0007)
- Pearson, K. (1899). XV. On certain properties of the hypergeometrical series, and on the fitting of such series to observation polygons in the theory of chance. *The London, Edinburgh, and Dublin Philosophical Magazine and Journal of Science*, 47(285), 236–246. doi:[10.1080/14786449908621253](https://doi.org/10.1080/14786449908621253)
- Pearson, K. (1900). X. On the criterion that a given system of deviations from the probable in the case of a correlated system of variables is such that it can be reasonably supposed to have arisen from random sampling. *The London, Edinburgh, and Dublin Philosophical Magazine and Journal of Science*, 50(302), 157–175. doi:[10.1080/14786440009463897](https://doi.org/10.1080/14786440009463897)
- Pearson, K. (1904). *Mathematical contributions to the theory of evolution. XIII. On the theory of contingency and its relation to association and normal correlation*. Biometric Series I. London: Dulau and Co.
- Pearson, K. (1911). *The Grammar of Science*. London (GB): Adam and Charles Black.
- Pearson, K., & Henrici, O. M. F. E. (1894). III. Contributions to the mathematical theory of evolution. *Philosophical Transactions of the Royal Society of London. (A.)* 185, 71–110. doi:[10.1098/rsta.1894.0003](https://doi.org/10.1098/rsta.1894.0003)
- Planck, M. K. E. L. (1937). *Der Kausalbegriff in der Physik* (Zweite, unveränderte Auflage). Verlag von Johann Ambrosius Barth.
- Planck, M. K. E. L. (1948). *Determinismus oder Indeterminismus?* (Zweite, unveränderte Auflage). Leipzig: Johann Ambrosius Barth Verlag.
- Poincaré, H. (1905). *Science and hypothesis*. Walter Scott. Retrieved from [London](https://www.walter-scott.com/).
- Poincaré, J. H. (1905). Sur la dynamique de l'électron. *Comptes rendus hebdomadaires des séances de l'Académie des sciences*, 140, 1504–1508.
- Pólya, G. (1920). Über den zentralen Grenzwertsatz der Wahrscheinlichkeitsrechnung und das Momentenproblem (In English: On the central limit theorem of probability calculation and the problem of moments). *Mathematische Zeitschrift*, 8(3–4), 171–181. doi:[10.1007/BF01206525](https://doi.org/10.1007/BF01206525)

- Popper, K. R. (1935). *The logic of scientific discovery. logik der forschung first published 1935 by verlag von julius springer, vienna, austria. first english edition published 1959 by hutchinson & co.* Julius Springer. Retrieved from <http://archive.org/details/PopperLogicScientificDiscovery>
- Popper, K. R. (2002). *Conjectures and Refutations: The Growth of Scientific Knowledge* (Überarb. A). London ; New York: Routledge.
- Post, E. L. (1920). Determination of all closed systems of truth tables. *Bulletin American Mathematical Society*, 26, 427.
- Priest, G. (1979). The logic of paradox. *Journal of Philosophical Logic*, 8(1). doi:10.1007/BF00258428
- Priest, G. (1998). What is so Bad about Contradictions? *The Journal of Philosophy*, 95(8), 410–426. doi:10.2307/2564636
- Quesada, F. M. (Ed.). (1977). *Heterodox logics and the problem of the unity of logic. In: Non-Classical Logics, Model Theory, and Computability: Proceedings of the Third Latin-American symposium on Mathematical Logic, Campinas, Brazil, July 11-17, 1976.* Arruda, A. I., Costa, N. C. A. da, Chuaqui, R. (Eds.). Studies In Logics And The Foundations Of Mathematics. Amsterdam ; New York : New York: North-Holland.
- Recorde, R. (1557). *The whetstone of witte, whiche is the seconde parte of Arithmetike: Containyng the extraction of Rootes: The Coblike practise, with the rule of Equation: And the woorkes of Surde Nombres.* London: Jhon Kyngstone. Retrieved June 5, 2019, from <http://archive.org/details/TheWhetstoneOfWitte>
- Reichenbach, H. (1930). Kausalität und Wahrscheinlichkeit. *Erkenntnis*, 1, 158–188.
- Reichenbach, H. (1956). *The direction of time* (M. Reichenbach, Ed.). University of California Press.
- Reichenbach, H. (1958). *The philosophy of space & time* (New engl. translation). Dover books. Dover.
- Reichenbach, H. (1978). Current epistemological problems and the use of a three-valued logic in quantum mechanics. In M. Reichenbach & R. S. Cohen (Eds.), *Hans reichenbach selected writings 1909–1953: Volume two* (pp. 226–236). Vienna Circle Collection. doi:10.1007/978-94-009-9855-1_6
- Rescher, N. (2005). *What if?: Thought experimentation in philosophy.* OCLC: 58604650. New Brunswick, N.J.: Transaction Publishers.

- Ricci-Curbastro, G., & Levi-Civita, T. (1900). Méthodes de calcul différentiel absolu et leurs applications. *Mathematische Annalen*, 54(1), 125–201. doi:[10.1007/BF01454201](https://doi.org/10.1007/BF01454201)
- Robertson, C. (1997a). *The Wordsworth dictionary of quotations*. OCLC: 473411270. Ware, Hertfordshire: Wordsworth Editions Ltd. Retrieved from <https://archive.org/details/wordsworthdictio00robe>
- Robertson, C. (1997b). *The Wordsworth dictionary of quotations*. OCLC: 473411270. Ware, Hertfordshire: Wordsworth Editions Ltd. Retrieved from <https://archive.org/details/wordsworthdictio00robe>
- Robins, J. M. (1999). Association, causation, and marginal structural models. *Synthese*, 121(1/2), 151–179.
- Robins, J. M., & Greenland, S. (1989). The probability of causation under a stochastic model for individual risk. *Biometrics*, 45(4), 1125–1138.
- Robins, J. M., & Greenland, S. (2000). Comment on “causal inference without counterfactuals” by a.p. dawid. *Journal of the American Statistical Association — Theory and Methods*, 95(450), 477–482.
- Rolle, M. (1690). *Traité d’algèbre ou principes généraux pour résoudre les questions de mathématique*. Paris (France): chez Estienne Michallet. Retrieved February 16, 2019, from <https://www.e-rara.ch/doi/10.3931/e-rara-16898>
- Romano, J. P., & Siegel, A. (1986). *Counterexamples in Probability And Statistics*. New York (USA): Chapman & Hall.
- Routley, R. (1979). Dialectical logic, semantics and metamathematics. *Erkenntnis*, 14(3), 301–331. doi:[10.1007/BF00174897](https://doi.org/10.1007/BF00174897)
- Routley, R., & Meyer, R. K. (1976). Dialectical logic, classical logic, and the consistency of the world. *Studies in Soviet Thought*, 16(1), 1–25. doi:[10.1007/BF00832085](https://doi.org/10.1007/BF00832085)
- Royce, J. (1917). *Negation*. Encyclopaedia of Religion and Ethics. J. Hastings (ed.) Charles Scribner’s Sons.
- Russell, B. (1912). On the notion of cause. *Proceedings of the Aristotelian Society*, 13, 1–26.
- Sachs, L. (1992). *Angewandte Statistik*. Berlin, Heidelberg: Springer Berlin Heidelberg.
- Sadowsky, D. A., Gilliam, A. G., & Cornfield, J. (1953). The statistical association between smoking and carcinoma of the lung. *Journal of the National Cancer Institute*, 13(5), 1237–1258.
- Salmon, W. C. (1980). Probabilistic causality. *Pacific Philosophical Quarterly*, 61(1–2), 50–74. doi:<https://doi.org/10.1111/j.1468-0114.1980.tb00004.x>

- Salmon, W. C. (1984). *Scientific explanation and the causal structure of the world*. Princeton University Press.
- Schaffer, J. (2001). Causes as probability raisers of processes. *The Journal of Philosophy*, 98(2), 75–92. doi:[10.2307/2678483](https://doi.org/10.2307/2678483)
- Scheid, H. (1992). *Wahrscheinlichkeitsrechnung*. Mathematische Texte. Mannheim: BI-Wiss.-Verl.
- Schrödinger, E. (1929). Was ist ein Naturgesetz? *Naturwissenschaften*, 17(1), 9–11. doi:[10.1007/BF01505758](https://doi.org/10.1007/BF01505758)
- Schrödinger, E. (1952). Are there quantum jumps? *British Journal for the Philosophy of Science*, 3(11), 233–242. doi:[10.1093/bjps/III.11.233](https://doi.org/10.1093/bjps/III.11.233)
- Schur, J. (1911). Bemerkungen zur theorie der beschränkten bilinearformen mit unendlich vielen veränderlichen. *Journal für die reine und angewandte Mathematik (Crelles Journal)*, 1911(140), 1–28. doi:[10.1515/crll.1911.140.1](https://doi.org/10.1515/crll.1911.140.1)
- Shumway, D. S., Robert H.;Stoffer. (2006). *Time series analysis and its applications: With r examples*. Springer texts in statistics. World Pub. Corp.
- Simpson, T. (1755). XIX. A letter to the Right Honourable George Earl of Macclesfield, President of the Royal Society, on the advantage of taking the mean of a number of observations, in practical Astronomy. *Philosophical Transactions of the Royal Society of London*, 49, 82–93. doi:[10.1098/rstl.1755.0020](https://doi.org/10.1098/rstl.1755.0020)
- Sober, E. (2001). Venetian Sea Levels, British Bread Prices, and the Principle of the Common Cause. *The British Journal for the Philosophy of Science*, 52(2), 331–346.
- Solomon, H. (1978). *Geometric probability*. CBMS-NSF regional conference series in applied mathematics. Society for Industrial and Applied Mathematics. Retrieved from <https://epubs.siam.org/doi/pdf/10.1137/1.9781611970418.fm>
- Sorensen, R. A. (1999). *Thought Experiments*. Oxford, New York: Oxford University Press.
- Speranza, J. L., & Horn, L. R. (2010). A brief history of negation. *Journal of Applied Logic*, 8(3), 277–301. doi:[10.1016/j.jal.2010.04.001](https://doi.org/10.1016/j.jal.2010.04.001)
- Spinoza and german idealism*. (2012). Cambridge University Press.
- Spinoza, B. D. (1802). *Opera quae supersunt omnia / iterum edenda curavit, praefationes, vitam auctoris, nec non notitias, quae ad historiam scriptorum pertinent* (Heinrich Eberhard Gottlob Paulus). In Bibliopolio Academico.

- Spirtes, P., Glymour, C., & Scheines, R. (1993). Formal preliminaries. In P. Spirtes, C. Glymour, & R. Scheines (Eds.), *Causation, prediction, and search* (pp. 25–40). Lecture Notes in Statistics. doi:[10.1007/978-1-4612-2748-9_2](https://doi.org/10.1007/978-1-4612-2748-9_2)
- Spohn, S. (1983). *Eine theorie der kausalität* (Doctoral dissertation, Ludwig Maximilians Universität München).
- Spohn, W. (1988). Ordinal conditional functions: A dynamic theory of epistemic states. In W. L. Harper & B. Skyrms (Eds.), *Causation in decision, belief change, and statistics: Proceedings of the irvine conference on probability and causation* (pp. 105–134). The University of Western Ontario Series in Philosophy of Science. doi:[10.1007/978-94-009-2865-7_6](https://doi.org/10.1007/978-94-009-2865-7_6)
- Stephani, H. (Ed.). (2003). *Exact solutions of Einstein's field equations* (2nd ed). Cambridge monographs on mathematical physics. Cambridge, UK ; New York: Cambridge University Press.
- Stiehler, G. (1974). Determiniertheit und entwicklung. *Deutsche Zeitschrift für Philosophie*, 22(4), 475–486. doi:[10.1524/dzph.1974.22.4.475](https://doi.org/10.1524/dzph.1974.22.4.475)
- Stoyanov, J. M. (2013). *Counterexamples in Probability* (Third Edition). Mineola, New York: DOVER PUBN INC.
- Suppes, P. (1970). *A probabilistic theory of causality*. Acta philosophica Fennica. North-Holland Pub. Co.
- Thompson, M. E. (2006). Ilija barukčić. causality. new statistical methods. a book review. *International Statistical Institute - Short Book Review*, 26(1), 6.
- Tolman, R. C. (1912). XXXIII. Non-Newtonian Mechanics, The Mass of a Moving Body. *The London, Edinburgh, and Dublin Philosophical Magazine and Journal of Science*, 23(135), 375–380. doi:[10.1080/14786440308637231](https://doi.org/10.1080/14786440308637231)
- Tombe, F. (2015). The 1856 Weber-Kohlrusch Experiment (The Speed of Light). *Journal: unknown*.
- Toohy, J. J. (1948). *An elementary handbook of logic*. New York, Appleton-Century-Crofts. Retrieved March 28, 2019, from <http://archive.org/details/anelementaryhan00toohgoog>
- Tschébychef, P. L. (1846). Démonstration élémentaire d'une proposition générale de la théorie des probabilités. *Journal für die reine und angewandte Mathematik (Crelles Journal)*, 1846(33), 259–267. doi:[10.1515/crll.1846.33.259](https://doi.org/10.1515/crll.1846.33.259)
- Tschébychef, P. L. (1867). Des valeurs moyennes. *Journal de Mathématiques Pures et Appliquées*, 12(2), 177–184.

- Tsopurashvili, T. (2012). Negatio negationis als paradigma in der eckhartschen dialektik. In *Universalità della ragione. a. musco (ed.)* (Vol. II.1, pp. 595–602). Luglio.
- Twardy, C. R., & Korb, K. B. (2004). A criterion of probabilistic causation*. *Philosophy of Science*, 71(3), 241–262. doi:[10.1086/421534](https://doi.org/10.1086/421534)
- Ulyanov, V. I. (1964). *Konspekt zu Hegels Wissenschaft der Logik* (1. Auflage). Lenin Werke. Dietz Verlag.
- Unknown, A. (1913). Kausale und konditionale Weltanschauung. *Nature*, 90(2261), 698–699. doi:[10.1038/090698a0](https://doi.org/10.1038/090698a0)
- Uspensky, J. v. (1937). *Introduction To Mathematical Probability*. New York (USA): McGraw-Hill Company.
- van Heusden, E. F. G., & Nieuwenhuizen, T. M. (2019). Simultaneous measurement of non-commuting observables in entangled systems. *The European Physical Journal Special Topics*, 227(15), 2209–2219. doi:[10.1140/epjst/e2019-800216-2](https://doi.org/10.1140/epjst/e2019-800216-2)
- Vatican, F. C. (2017). *Enchiridion symbolorum definitionum et declarationum de rebus fidei et morum (German: Kompendium der Glaubensbekenntnisse und kirchlichen Lehrentscheidungen)* (45. Auflage). Herder.
- Verworn, M. (1912). *Kausale und konditionale Weltanschauung*. Jena: Verlag von Gustav Fischer.
- Voigt, W. (1887). *Über das doppler'sche princip*. Nachrichten von der Königl. Gesellschaft der Wissenschaften und der Georg-Augusts-Universität zu Göttingen. Dieterichsche Verlags-Buchhandlung. Retrieved from <http://archive.org/details/nachrichtenvond04gtgoog>
- Voigt, W. (1898). *Die fundamentalen physikalischen Eigenschaften der Krystalle in elementarer Darstellung*. Verlag von Veit und Companie. Retrieved from http://archive.org/details/bub_gb__Ps4AAAAMAAJ
- Von Engelhardt, D. (1993). Causality and Conditionality in Medicine around 1900. In H. T. Engelhardt, S. F. Spicker, C. Delkeskamp-Hayes, & M. A. G. Cutter (Eds.), *Science, Technology, and the Art of Medicine* (Vol. 44, pp. 75–104). doi:[10.1007/978-94-017-2960-4_6](https://doi.org/10.1007/978-94-017-2960-4_6)
- von Neumann, J. (1932). *Mathematische grundlagen der quantenmechanik*. Springer Verlag.
- Wallis, J. (1655). *De sectionibus conicis nova methodo expositis tractatus*. typis Leon. Lichfield; impensis Tho. Robinson. Retrieved from <http://dx.doi.org/10.3931/e-rara-38681>

- Wallisii, I. (1656). *Arithmetica infinitorum, sive nova methodus inquirendi in curvilinearum quadraturam, aliaq difficiliora problemata matheseos*. doi:[10.3931/e-rara-38681](https://doi.org/10.3931/e-rara-38681)
- Watkins, E. (2004). Kant's model of causality: Causal powers, laws, and kant's reply to hume. *Journal of the History of Philosophy*, 42(4), 449–488. doi:[10.1353/hph.2004.0081](https://doi.org/10.1353/hph.2004.0081)
- Weber, W. E., & Kohlrausch, R. (1856). Ueber die Elektrizitätsmenge, welche bei galvanischen Strömen durch den Querschnitt der Kette fließt. *Annalen der Physik und Chemie*, 99, 10–25.
- Weber, W., & Kohlrausch, R. (1857). Elektrodynamische Maassbestimmungen: Insbesondere Zurueckfuehrung der Stroemintensitaetsmessungen auf mechanisches Maass. *Abhandlungen der Königlich-Sächsischen Gesellschaft der Wissenschaften*, 5 (Leipzig: S. Hirzel).
- Wedin, M. V. (1990). Negation and quantification in aristotle. *History and Philosophy of Logic*, 11(2), 131–150. doi:[10.1080/01445349008837163](https://doi.org/10.1080/01445349008837163)
- Wenmackers, S. (2011). *Philosophy of probability. foundations, epistemology, and computation* (PhD-dissertation of University of Groningen). University of Groningen, The Netherlands.
- Werkmeister, W. H. (1936). The second international congress for the unity of science. *The Philosophical Review*, 45(6), 593–600.
- Whitworth, W. A. (1901). *Choice and Chance. With 1000 Exercises* (Fifth Edition). Cambridge: Deighton, Bell & Co. Retrieved August 12, 2020, from <https://archive.org/details/choicechancewith00whituoft>
- Widmann, J. (1489). *Behende und hüpsche Rechenung auff allen Kauffmanschafft*. Leipzig (Holy Roman Empire): Conrad Kachelofen. Retrieved from <http://hdl.loc.gov/loc.rbc/Rosenwald.0143.1>
- Wiener, N. (1948). *Cybernetics or control and communication in the animal and the machine* (1. ed.). J. Wiley. Retrieved from <https://archive.org/details/cyberneticsorcon00wien>
- Williamson, J. (2005). *Bayesian nets and causality: Philosophical and computational foundations*. Oxford University Press.
- Williamson, J. (2009). Probabilistic theories of causality. In H. Beebe, P. Menzies, & C. Hitchcock (Eds.), *The oxford handbook of causation* (pp. 185–212). Oxford University Press.
- Wilson, R. J. (2018). *Euler's pioneering equation: The most beautiful theorem in mathematics* (First edition). OCLC: ocn990970269. Oxford, United Kingdom: Oxford University Press.

- Woods, J., & Walton, D. (1977). Post Hoc, Ergo Propter Hoc. *The Review of Metaphysics*, 30(4), 569–593. Retrieved April 12, 2020, from <https://www.jstor.org/stable/20126985>
- Wright, S. (1921). Correlation and causation. *Journal of Agricultural Research*, 20(6). Retrieved from <https://pdfs.semanticscholar.org/90bd/1ea6df6cf7ff14c392818751270b93d53d4e.pdf>
- Yates, F. (1934). Contingency Tables Involving Small Numbers and the Chi square Test. *Supplement to the Journal of the Royal Statistical Society*, 1(2), 217–235. doi:10.2307/2983604
- Yeng, S., Lin, T., & Lin, Y.-F. (2008). The n-dimensional pythagorean theorem. *Linear and Multilinear Algebra*. Publisher: Gordon and Breach Science Publishers.
- Yule, G. U. [George Udny]. (1912). On the methods of measuring association between two attributes. *Journal of the Royal Statistical Society*, 75(6), 579–652. doi:10.2307/2340126
- Yule, G. U. [George Udny], & Pearson, K. (1900). Vii. on the association of attributes in statistics: With illustrations from the material of the childhood society, &c. *Philosophical Transactions of the Royal Society of London. Series A, Containing Papers of a Mathematical or Physical Character*, 194(252–261), 257–319. doi:10.1098/rsta.1900.0019
- Zadeh, L. A. (1965). Fuzzy sets. *Information and Control*, 8(3), 338–353. doi:10.1016/S0019-9958(65)90241-X
- Zadeh, L. A. (1968). Fuzzy algorithms. *Information and Control*, 12(2), 94–102. doi:10.1016/S0019-9958(68)90211-8
- Zadeh, L. A. (1971). Quantitative fuzzy semantics. *Information Sciences*, 3(2), 159–176. doi:10.1016/S0020-0255(71)80004-X
- Zadeh, L. A. (1984). Fuzzy probabilities. *Information Processing and Management. Special Issue Information Theory Applications to Problems of Information Science*, 20(3), 363–372. doi:10.1016/0306-4573(84)90067-0
- Zadeh, L. A. (1996). Fuzzy logic = computing with words. *IEEE Transactions on Fuzzy Systems*, 4(2), 103–111. doi:10.1109/91.493904
- Zadeh, L. A. (1997). Toward a theory of fuzzy information granulation and its centrality in human reasoning and fuzzy logic. *Fuzzy Sets and Systems. Fuzzy Sets: Where Do We Stand? Where Do We Go?*, 90(2), 111–127. doi:10.1016/S0165-0114(97)00077-8
- Zesar, P. M. (2013). *Nihil fit sine causa - die kausalität im spanischen und portugiesischen: Diplomarbeit. magister der philosophie.*

- Universität Wien. Retrieved from http://othes.univie.ac.at%20/25095/1/%202013-01-22_0506065.pdf
- Zwergel, H. A. (1975). Principium contradictionis. *Zeitschrift für Philosophische Forschung*, 29, 313–315.

Index

- Anti-Dühring: Dialectics of Nature*, 298, 426
- Chinese mathematics in the thirteenth century: the Shu-shu chiu-chang of Ch'in Chiu-shao*, 83, 434
- Co-relations and their measurement, chiefly from anthropometric data*, 49, 57, 427
- Das Kapital. Kritik der politischen Oekonomie. Erster Band. Buch I: Der Produktionsprozess des Kapitals.*, 40, 41, 435
- Das Verhältnis von Kausalität und Gesetz in der Physik*, 46, 430
- Denumerable Markov chains*, 226, 431
- Die Kausalität*, 46, 50, 59, 113, 228, 250, 279, 331, 364, 419, 420
- Die fundamentalen physikalischen Eigenschaften der Krystalle in elementarer Darstellung*, 143, 442
- Enchiridion symbolorum definitionum et declarationum de rebus fidei et morum (German: Kompendium der Glaubensbekenntnisse und kirchlichen Lehrentscheidungen)*, 412, 442
- Entwicklung des physikalischen Kausalschemas bis Julius Robert Mayer*, 348, 435
- III. Contributions to the mathematical theory of evolution*, 136, 139, 437
- IX. A dynamical theory of the electric and luminiferous medium.— Part III. Relations with material media*, 292, 433
- LVII. The principle of relativity, and non-newtonian mechanics*, 316, 434
- LII. An essay towards solving a problem in the doctrine of chances. By the late Rev. Mr. Bayes, F. R. S. communicated by Mr. Price, in a letter to John Canton, A. M. F. R. S.*, 60, 421
- N-th index D-dimensional Einstein gravitational field equations. Geometry unchained*, 70, 74, 146, 149, 267, 421
- O logice trójwartościowej*, 327, 434
- Omnis determinatio est negatio— Determination, Negation and Self-Negation in Spinoza, Kant, and Hegel. In: Spinoza and German idealism. Eckart Forster & Yitzhak Y. Melamed (eds.)*, 278, 427
- On necessary and sufficient conditions*, 198, 427
- Special Issue: Ever New “Loopholes” in Bell’s Argument and Experimental Tests*, 71, 429

- Untersuchungen über den Aussagenkalkül*, 327, 434
- VII. *Mathematical contributions to the theory of evolution.—III. Regression, heredity, and panmixia*, 49, 50, 52, 57, 436
- Växjö *interpretation of wave function: 2012*, 71, 432
- XIV. *The use of factorial moments in the treatment of the hypergeometric distribution and in tests for regression*, 180, 252, 428
- XIX. *A letter to the Right Honourable George Earl of Macclesfield, President of the Royal Society, on the advantage of taking the mean of a number of observations, in practical Astronomy*, 136, 440
- XV. *On certain properties of the hypergeometrical series, and on the fitting of such series to observation polygons in the theory of chance*, 180, 252, 437
- XV.—*The Correlation between Relatives on the Supposition of Mendelian Inheritance.*, 136, 427
- XXXIII. *Non-Newtonian Mechanics, The Mass of a Moving Body*, 316, 441
- Zum intuitionistischen Aussagenkalkül*, 327, 428
- Über die Rolle der Bedingungen für das Wirken objektiver Gesetze*, 407, 432
- Über das Doppler'sche Princip*, 292, 442
- Über das konditionale Denken in der Medizin und seine Bedeutung für die Praxis*, 163, 428
- Über den anschaulichen Inhalt der quantentheoretischen Kinematik und Mechanik*, 71, 72, 404, 429
- Über die Wahrscheinlichkeit der Potenzsummen der Beobachtungsfehler und über einige damit im Zusammenhange stehende Fragen*, 176, 177, 429
- Über formal unentscheidbare Sätze der Principia Mathematica und verwandter Systeme I*, 273, 428
- Über kausale und statistische Gesetzmäßigkeit in der Physik*, 32, 435
- Über Kurven und Flächen in allgemeinen Räumen*, 110, 426
- Lukasiewicz, Jan, 327, 434
- Über den zentralen Grenzwertsatz der Wahrscheinlichkeitsrechnung und das Momentenproblem (In English: On the central limit theorem of probability calculation and the problem of moments)*, 231, 437
- Über die Rolle der Bedingungen für das Wirken objektiver Gesetze*, 69, 432
- A brief history of negation*, 293, 440
- A Criterion of Probabilistic Causation**, 65, 442
- A history of epidemiologic methods and concepts*, 202, 435
- A method of estimating comparative rates from clinical data; applications to cancer of the lung, breast, and cervix*, 202, 203, 207, 424
- A natural history of negation*, 291, 293, 294, 305, 430
- A primer on determinism*, 69, 425
- A probabilistic analysis of causation*, 63, 428
- A probabilistic theory of causality*, 32, 64, 112, 357, 441
- A system of logic, ratiocinative and inductive: being a connected view of the principles of evidence, and methods of scientific investigation*, 191, 435
- A Theory of Causality*, 64, 428
- A Treatise of Human Nature: Being an Attempt to Introduce the Experimental Method of Reasoning into Moral Subjects*, 98, 348, 431

- A. I. Ujomow: *Über das zeitliche Verhältnis zwischen Ursache und Wirkung*, 339, 432
- Against Modularity, the Causal Markov Condition, and Any Link between the Two: Comments on Hausman and Woodward*, 61, 226, 424
- Algebra And Trigonometry*, 99, 422
- Allgemeine Philosophie des Seins und der Natur*, 279, 364, 428
- An Alternative to Creatio ex Nihilo*, 291, 427
- An elementary handbook of logic*, 7, 441
- An enquiry concerning human understanding*, 27, 30, 33, 347, 431
- An investigation of the laws of thought, on which are founded the mathematical theories of logic and probabilities*, 292, 293, 297, 311, 314, 423
- Analyse mathématique sur les probabilités d es erreurs de situation d'un point*, 49, 50, 52, 423
- Analysis of Switching Resistive Circuits A Method Based on the Unification of Boolean and Ordinary Algebras*, 85, 86, 88, 250, 251, 417, 421
- Anderson, P. W., 309, 419
- Angewandte Statistik*, 52, 134, 324, 409, 439
- Anti Aristotle—The Division of Zero by Zero*, 85, 86, 88, 306, 417, 421
- Anti Chsh—Refutation of the Chsh Inequality*, 73, 419
- Anti Einstein – Refutation of Einstein's General Theory of Relativity*, 94, 419
- Anti Heisenberg – Refutation of Heisenberg's Uncertainty Principle*, 73, 404, 419
- Anti Heisenberg—Refutation Of Heisenberg's Uncertainty Relation*, 73, 404, 419
- Anti Heisenberg—The End of Heisenberg's Uncertainty Principle*, 404, 420
- Anti Bohr — Quantum Theory and Causality*, 50, 71, 420
- Anti-Bell - Refutation of Bell's theorem*, 73, 419
- Approximatio ad summam terminorum binomii $(a+b)^n$ in seriem expansi*, 139, 435
- Are Necessary and Sufficient Conditions Converse Relations?*, 198, 428
- Are There Quantum Jumps?*, 88, 440
- Aristotle, 24, 286, 287, 295, 419
- Aristotle, (384-322 BCE)
- Conditions, 24
 - Necessary conditions, 24
 - Theory of Causality, 24
- Aristotle's law of contradiction and Einstein's special theory of relativity*, 6, 73, 103, 288, 289, 291, 421
- Arithmetica infinitorum, Sive Nova methodus inquirendi in curvilinearum quadraturam, aliaq difficiliora problemata matheseos*, 88, 89, 443
- Arithmetices principia: nova methodo*, 86, 436
- Ars conjectandi, Opus posthumus: Accedit Tractatus de seriebus infinitis ; et epistola Gallice scripta De Ludo Pilae Reticularis*, 30, 113, 139, 422
- Association, Causation, and Marginal Structural Models*, 60, 439
- Axiomatisches Denken*, 274, 430
- Ayer, A. J., 291, 293, 419
- Bar, Carl Ludwig von, 191, 192, 419
- Barukčić, Ilija, 6, 9, 10, 14, 18, 20, 22, 46, 50, 59, 70, 71, 73, 74, 80, 85, 86, 88, 92, 94, 98, 103, 104, 110, 112, 113, 119, 146, 149, 167–169, 171, 173, 176–178, 180, 182, 183, 185, 186, 189, 190, 199, 201, 206, 219, 228, 230–233, 235, 236, 238, 239, 241–243, 245, 246, 250–252,

- 267, 279, 288, 289, 291, 306, 308, 316, 331, 347, 364, 404, 417, 419–421
- Barukčić, Jan Pavo, 85, 86, 88, 306, 417, 421
- Basharin, Gely P., 226, 421
- Bayes, Thomas, 60, 421
- Bayesian nets and causality: philosophical and computational foundations*, 32, 443
- Beckert, Rudi, 433
- Behende und hüpsche Rechnung auff allen Kauffmanschafft*, 80, 84, 443
- Beiträge zur Begründung der transfiniten Mengenlehre*, 122, 423
- Bell, John Stewart, 72, 73, 422
- Bemerkungen zur Theorie der beschränkten Bilinearformen mit unendlich vielen Veränderlichen.*, 155, 440
- Berkeley, Bishop George (1685–1753), 37
- Bernoulli, Jacobi, 30, 113, 139, 422
- Bernstein, Sergei Natanowitsch, 226, 422
- Bettinger, Alvin K., 99, 422
- Bienaymé, Irénée-Jules, 321, 422
- Blalock, Hubert M., 53, 55, 422
- Bobzien, Susanne, 19, 422
- Bocheński, Joseph M., 194, 422
- Bohr, Niels, 72, 422
- Bombardier, C., 6, 422
- Bombelli, Raffaele, 80, 83, 129, 422
- Boole, George, 292, 293, 297, 311, 314, 423
- Born, Max, 125, 127, 128, 423
- Brans, C., 144, 423
- Bravais, Auguste, 49, 50, 52, 423
- Brian, Denis, 417, 423
- Bruno, Giordano, 348, 423
- Bundesgerichtshof für Strafsachen, Bundesanwaltschaft, 192, 423
- Burgos-Vargas, R., 422
- Can Quantum-Mechanical Description of Physical Reality Be Considered Complete?*, 33, 38, 42, 426
- Cantor, Georg, 122, 423
- Cargile, James, 12, 423
- Carnap, Rudolf (1891-1970), 63
- Carnielli, Walter, 288, 423
- Carnielli, Walter A., 20, 288, 423
- Carter, K. C., 59, 423
- Cartwright, Nancy, 32, 61, 65, 226, 423, 424
- Cauchy, Augustin Louis, 92, 424
- Causal Inference without Counterfactuals*, 31, 424
- Causal inferences in nonexperimental research*, 53, 55, 422
- Causal Laws and Effective Strategies*, 65, 423
- Causal relationship k*, 110, 199, 250, 421
- Causality
- Independence, 47
- Causality and Complementarity*, 72, 422
- Causality and Determinism*, 47, 65, 430
- Causality and Determinism: Tension, or Outright Conflict?*, 69, 430
- Causality and Conditionality in Medicine around 1900*, 191, 442
- Causality: models, reasoning, and inference*, 32, 56, 60–62, 410, 436
- Causality: New statistical methods*, 50, 250, 419
- Causation*, 31, 434
- Causes and Conditions*, 199, 200, 434
- Causes as Probability Raisers of Processes*, 63, 440
- Chairman, Max Halperin, 139, 424
- Chignell, Andrew, 34, 424
- China and Albert Einstein: the Reception of the Physicist and His Theory in China, 1917-1979*, 9, 430
- Choice and Chance. With 1000 Exercises*, 121, 129, 131, 443
- Classical Logic And The Division By Zero*, 80, 85, 86, 88, 92, 306, 417, 421
- Clauser, John F., 73, 424
- Comment on "Causal Inference Without Counterfactuals" by A.P. Dawid*, 60, 439
- Comparison of upper gastrointestinal toxicity of rofecoxib and naproxen*

- in patients with rheumatoid arthritis. VIGOR Study Group*, 6, 422
- Condition
- necessary, 24
- Coniglio, Marcelo Esteban, 288, 423
- Conjectures and Refutations: The Growth of Scientific Knowledge*, 9, 411, 438
- Considérations a l'appui de la découverte de Laplace sur la loi de probabilité dans la méthode des moindres carrés*, 321, 422
- Contingency Tables Involving Small Numbers and the Chi square Test*, 141, 169, 171, 173, 176, 183, 186, 190, 239, 241, 243, 246, 444
- Cornfield, J., 202, 203, 207, 424, 439
- Correlation and causation*, 409, 410, 444
- Cotes, Roger, 84, 424
- Counterexamples in Probability*, 13, 441
- Counterexamples in Probability And Statistics*, 13, 439
- Counterfactuals*, 31, 434
- Cours d'analyse de l'Ecole Royale Polytechnique. Première partie: Analyse Algébrique*, 92, 424
- Creatio ex nihilo*, 291, 425
- Creation Ex Nihilo*, 291, 424
- Critic der reinen Vernunft*, 34–38, 40, 431
- Cum hoc, ergo propter hoc*, 344, 432
- Current Epistemological Problems and the use of a Three-Valued Logic in Quantum Mechanics*, 70, 405, 438
- Cybernetics or control and communication in the animal and the machine*, 265, 443
- Démonstration élémentaire d'une proposition générale de la théorie des probabilités.*, 121, 226, 321, 441
- Da Costa, Newton C. A., 14, 288, 424
- Da Costa, Newton Carneiro Alfonso, 14, 288, 424
- Das Gesetz*, 407, 430
- Das Kausalprinzip*, 27, 278, 279, 364, 429
- Das zeitliche Verhältnis von Ursache und Wirkung*, 339, 433
- Das Problem der Kausalität*, 28–30, 279, 364, 432
- Davis, B., 422
- Davis, Chandler, 155, 424
- Dawid, A. P., 31, 424
- De causa gravitatis et defensio sententiae auctoris de veris naturae legibus contra Cartesianos*, 348, 433
- De la causa, principio et uno. Translated into German: Über die Ursache, das Prinzip und das Eine*, 348, 423
- De mundi sensibilis atque intelligibilis forma et principiis (Kant's inaugural dissertation of 1770 Translated by William Julius Eckoff)*, 37, 414, 431
- De mundi sensibilis atque intelligibilis forma et principiis. Dissertatio pro loco*, 37, 414, 431
- De Raedt, Hans, 429
- De ratiociniis in ludo alae: In: Exercitationum mathematicarum liber primus [- quintus]*, 121, 129, 131, 180, 252, 431
- De relatieve beweging van de aarde en den aether*, 292, 434
- De sectionibus conicis nova methodo expositis tractatus*, 88, 442
- Dedication, v
- DeGroot, Morris H., 98, 134, 135, 138, 324, 424
- Der Kausalbegriff in der Physik*, 69, 405, 406, 437
- Der Konditionalismus und seine Kritik in der sowjetischen Wissenschaft*, 163, 432
- Des valeurs moyennes*, 226, 321, 441
- Determination of all closed systems of truth tables*, 327, 438
- Determiniertheit und Entwicklung*, 46, 441

- Determinismus oder Indeterminismus?*, 405, 437
- Dialectical logic, classical logic, and the consistency of the world*, 288, 439
- Dialectical logic, semantics and metamathematics*, 288, 439
- Dicke, R. H., 144, 423
- Die Grundlage der allgemeinen Relativitätstheorie*, 70, 110, 144, 145, 149, 164, 414, 425
- Die Lehre vom Kausalzusammenhang im Recht, besonders im Strafrecht*, 191, 192, 419
- Die Feldgleichungen der Gravitation*, 144, 425
- Die Selbstbeziehung der Negation in Hegels Logik*, 278, 293, 432
- Donnelly, John, 291, 424
- Drude, Paul, 80, 83, 425
- Dubarle, Dominique, 288, 425
- Earman, John, 69, 425
- Easwaran, Kenny, 274, 425
- Edgeworth, Francis Ysidro, 49, 425
- Eells, Ellery, 65, 425
- Efron, Bradley, 136, 425
- Ehrhardt, Arnold, 291, 425
- Eine Theorie der Kausalität*, 32, 441
- Einstein
 Refutation of a theory, 7
- Einstein and the quantum theory*, 38, 436
- Einstein, A., 67, 112, 425
- Einstein, Albert, 7, 33, 38, 42, 70, 105, 110, 114, 126, 144, 145, 149, 164, 274, 275, 292, 316, 414–416, 425, 426
- Einstein, Albert (1879–1955), 23
 - Experience, 33
 - Kant vs. Einstein, 35, 37, 38
 - Reichenbach, 63
- Einstein, Kant, and the A Priori**, 38, 427
- Einstein, Nordström and the early demise of scalar, Lorentz-covariant theories of gravitation*, 144, 436
- Einstein: a biography*, 340, 435
- Einstein: a life*, 417, 423
- Elektrodynamische Maassbestimmungen: insbesondere Zurueckfuehrung der Stroemintensitaetsmessungen auf mechanisches Maass*, 80, 83, 443
- Elementary Derivation of the Equivalence of Mass and Energy*, 144, 426
- Engels, Friedrich, 298, 426
- Englund, John A., 99, 422
- Entscheidungen des Bundesgerichtshofes*, 192, 423
- Essai philosophique sur les probabilités*, 69, 405, 433
- Euclid, of Alexandria (300 BCE), 94, 426
- Euclids elements of geometry*, 94, 426
- Euler's pioneering equation: the most beautiful theorem in mathematics*, 84, 443
- Euler, Leonhard, 84, 89, 90, 426
- Ex contradictione non sequitur quodlibet*, 20, 288, 423
- Exact solutions of Einstein's field equations*, 144, 441
- Explication de l'arithmétique binaire, qui se sert des seuls caractères O et I avec des remarques sur son utilité et sur ce qu'elle donne le sens des anciennes figures chinoises de Fohy*, 80, 433
- Faust. Eine Tragödie.*, 294, 428
- Fichte, Johann Gottlieb, 279, 426
- Finsler, Paul, 110, 426
- Fisher, Ronald Aylmer, 136, 139, 142, 178, 202, 203, 252, 426, 427
- FitzGerald, George Francis, 292, 427
- Ford, Lewis S., 291, 427
- Formal Preliminaries*, 60, 441
- Foundations of the theory of probability*, 52, 53, 66, 67, 108, 112, 121, 134, 136, 137, 165, 166, 170, 174, 182, 228, 229, 231, 234, 321, 360, 432
- Frequency Distribution of the Values of the Correlation Coefficient*

- in Samples from an Indefinitely Large Population*, 139, 426
 Friedman, Michael, 38, 427
Fuzzy algorithms, 327, 444
Fuzzy logic = computing with words, 327, 444
Fuzzy probabilities, 327, 444
Fuzzy sets, 327, 444
 Förster, Eckart, 278, 427
- Gödel, Kurt, 273, 428
 Galton, Francis, 49, 50, 52, 57, 427
Gastric Cancer and Epstein-Barr Virus Infection, 168, 171, 173, 176, 182, 185, 189, 230, 232, 235, 238, 241, 242, 245, 420
 Gauss, Carolo Friderico, 136, 139, 427
 Geeraerts, Dirk, 198, 427
Geometric probability, 99, 440
Geometric probability theory and Jaynes's methodology, 97, 430
Geometrie und Erfahrung. Erweiterte Fassung des Festvortrages Gehalten an der Preussischen Akademie der Wissenschaften zu Berlin am 27. Januar 1921, 415, 416, 426
Geometrization of Probability, 97, 99, 435
 Geysler, Gerhard Joseph Anton Maria, 279, 364, 428
 Gilliam, A. G., 439
 Glymour, Clark, 441
 Glynn, Luke, 63, 428
Glyphosate and Non-Hodgkin lymphoma: No causal relationship, 180, 252, 421
 Goenner, Hubert, 144, 428
 Goethe, Johann Wolfgang von, 294, 428
 Gomes, Gilberto, 198, 428
 Gonin, H. T., 180, 252, 428
 Good, I. J., 64, 428
 Gosset, William Sealey, 139, 428
Gravitation, 268, 269, 435
 Greenland, Sander, 60, 439
 Greenwood, Major, 202, 206, 428
Grundbegriffe der Wahrscheinlichkeitsrechnung (Reprint 1973), 53, 111, 112, 121, 432
Grundriß der formalen Logik, 194, 422
 Gödel, Kurt, 327, 428
- Hörz, Herbert, 46, 430
 Hadamard, Jacques, 155, 428
 Haldane, John Burdon Sanderson, 49, 56, 428
 Halley, Edmond, 84, 424
 Hansemann, David Paul von, 163, 428
 Hartley, H. O., 424
 Hausman, Daniel M., 61, 429
Hayes v. Michigan Central R. Co., 111 U.S. 228, 192, 431
 Hedwig, Klaus, 291, 293, 429
Hegel's Science of logic. Transl. by A. V. Miller. Edited by H. D. Lewis, 40, 43–46, 196–198, 278, 280, 286, 296, 335, 343, 344, 346, 347, 350, 429
 Hegel, Georg Wilhelm Friedrich, 40, 43–46, 196–198, 278, 280, 286, 292, 296, 334, 335, 343, 344, 346, 347, 350, 429
 Hegel, Georg Wilhelm Friedrich (1770–1831)
 - Causality, 45, 335
 - Kant's scepticisms, 40
 - Necessity, 45
 Heinemann, F. H., 291, 293, 429
 Heisenberg, Werner, 340, 429
 Heisenberg, Werner Karl, 71, 72, 404, 429
 Helmert, Friedrich Robert, 176, 177, 429
 Henle, Friedrich Gustav Jacob, 59, 429
 Henrici, Olaus Magnus Friedrich Erdmann, 136, 139, 437
 Hess, Karl, 71, 429
 Hessen, Johannes, 27, 278, 279, 364, 429
 Hesslow, Germund, 47, 65, 429, 430
Heterodox logics and the problem of the unity of logic. In: Non-Classical Logics, Model Theory, and Computability: Proceedings

- of the Third Latin-American symposium on Mathematical Logic, Campinas, Brazil, July 11-17, 1976. Arruda, A. I., Costa, N. C. A. da, Chuaqui, R. (Eds.),* 14, 288, 438
- Heyden, Günter, 407, 430
- Hilbert, David, 274, 430
- Hill, Austin Bradford, 59, 430
- Hochheim, Meister Eckhart von, 291, 430
- Hoefer, Carl, 69, 430
- Hoel, P. G., 424
- Holbach, Paul Henri Thiry d', 25, 26, 44, 430
- Holbach, Paul-Henri Thiry (1723-1789), 25
- causal chain, 25
 - cause, 25
 - effect, 25
- Holik, Federico, 97, 430
- Holt, Richard A., 424
- Horn, Laurence R., 291, 293, 294, 305, 430, 440
- Horne, Michael A., 424
- Horowitz, Tamara, 423
- Hotelling, Harold, 142, 430
- How the laws of physics lie*, 32, 61, 423
- Hu, Danian, 9, 430
- Huber, Franz, 32, 430
- Human Cytomegalovirus is the Cause of Glioblastoma Multiforme*, 168, 171, 173, 176, 182, 185, 189, 230, 232, 235, 238, 241, 242, 245, 420
- Human Papillomavirus—The Cause of Human Cervical Cancer*, 112, 420
- Hume, David, 27, 30, 33, 98, 347, 348, 431
- Hume, David (1711-1776)
- Causality, 27
 - Causality and temporal direction, 28
 - Induction, 27
 - Post hoc ergo propter hoc logical fallacy, 28
- Hundert Autoren gegen Einstein*, 12, 431
- Huygens, Christiaan, 121, 129, 131, 180, 252, 431
- Höfding, Wassily, 358, 430
- Ilija Barukčić. *Causality. New Statistical Methods. A Book Review.*, vii, 251, 441
- Immanuel Kant's Critique Of Pure Reason*, 40, 249, 431
- Independence, Invariance and the Causal Markov Condition*, 61, 429
- Index of Independence*, 119, 178, 420
- Index of Unfairness*, 119, 178, 420
- Induktion and Deduktion in der Physik*, 7, 274, 275, 425
- Introductio in analysin infinitorum*, 84, 426
- Introduction to geometric probability*, 97, 432
- Introduction To Mathematical Probability*, 21, 30, 113, 122, 126, 129, 217, 221, 442
- Israël, Hans, 12, 431
- IX. On the problem of the most efficient tests of statistical hypotheses*, 122, 251, 436
- Justice Matthews, Mr., 192, 431
- Kant, Immanuel, 33–38, 40, 249, 414, 431
- Kant, Immanuel (1724-1804), 33
- Causality and co-occurrence of events, 35
 - Causality and temporal direction, 34
 - Ding an sich selbst, 37
 - Einstein vs. Kant, 38
 - Epistemological agnosticism, 36
 - Kant and post hoc, ergo propter hoc logical fallacy, 34
 - Nature of space, 37
 - Nature of time, 36
 - Principium causalitatis, 34
 - Transcendental conception of causality, 34
- Kant's Model of Causality: Causal Powers, Laws, and Kant's Reply to Hume*, 27, 443
- Kant's Theory of Causation and Its Eighteenth-Century German Background*, 34, 424

- Karl Pearson, 1857-1957. Being a Centenary Lecture*, 49, 56, 428
- Kausale und konditionale Weltanschauung*, 163, 442
- Kausalgesetz und Quantenmechanik*, 340, 429
- Kausalität und Wahrscheinlichkeit*, 32, 63, 72, 438
- Kausalitätsprüfung im Strafrecht*, 191, 433
- Kay, David C., 145, 431
- Kemeny, John G., 226, 431
- Khrennikov, Andrei, 71, 429, 432
- Kienle, Gunver S., 344, 432
- Klain, Daniel A., 97, 432
- Knapp, Anthony W., 431
- Knuth, Donald E., 92, 432
- Koch's postulates in relation to the work of Jacob Henle and Edwin Klebs*, 59, 423
- Koch, Anton Friedrich, 278, 293, 432
- Koch, Robert, 59, 432
- Kohlrausch, R., 80, 83, 443
- Kolmogoroff, Andreï Nikolaevich, 52, 53, 66, 67, 108, 111, 112, 121, 134, 136, 137, 165, 166, 170, 174, 182, 228, 229, 231, 234, 321, 360, 432
- Konспект zu Hegels Wissenschaft der Logik*, 41, 442
- Korb, Kevin B., 65, 442
- Korch, Helmut, 28–30, 279, 364, 432
- Kosmologische Betrachtungen zur allgemeinen Relativitätstheorie*, 70, 114, 144, 425
- Kröber, Günter, 407, 432
- Krancberg, Sigmund, 41, 432
- Kritik der reinen Vernunft*, 34, 431
- Kröber, Günter, 69, 163, 339, 432
- Kunen, Kenneth, 291, 293, 433
- L' algebra : opera di Rafael Bombelli da Bologna, divisa in tre libri : con la quale ciascuno da se potrà venire in perfetta cognitione della teorica dell'Aritmetica : con una tavola copiosa delle materie, che in essa si contengono*, 80, 83, 129, 422
- Laine, L., 422
- Langville, Amy N., 421
- Laplace, Pierre Simon de, 69, 405, 433
- Larmor, Joseph, 292, 433
- Lee, E. T., 327, 433
- Leibniz, Gottfried Wilhelm, 88, 278, 348, 433
- Leibniz, Gottfried Wilhelm Freiherr von, 80, 433
- Lekschas, John, 191, 433
- Leon Brillouin, 106, 127, 433
- Lesser, Horst, 339, 433
- Levi-Civita, Tullio, 143, 439
- Lewis Causation is a Special Case of Spohn Causation*, 32, 430
- Lewis, David, 63, 434
- Lewis, David Kellogg, 31, 434
- Lewis, Gilbert N., 316, 434
- Libbrecht, Ulrich, 83, 434
- Libri, Guillaume, 92, 434
- Lin, T., 444
- Lin, You-Feng, 444
- Locality and Non locality*, 104, 110, 308, 421
- Logique et dialectique*, 288, 425
- Logometria*, 84, 424
- Lorentz, Hendrik Antoon, 103, 292, 434
- Lukasiewicz, Jan, 286, 434
- Mémoire sur les fonctions discontinues*, 92, 434
- Méthodes de calcul différentiel absolu et leurs applications*, 143, 439
- Mach's Principle and a Relativistic Theory of Gravitation*, 144, 423
- Mackie, J. L., 199, 200, 434
- Maor, Eli, 100, 434
- Marcos, João, 20, 288, 423
- Markov, Andrei Andreevich, 226, 434
- Marx, Karl, 40, 41, 435
- Massey, Gerald J., 423
- Massri, Cesar, 430
- Mathematical contributions to the theory of evolution. XIII. On the theory of contingency and*

- its relation to association and normal correlation*, 57, 113, 437
- Mathematische Grundlagen der Quantenmechanik*, 86, 124, 442
- Maxwell, James Clerk, 261, 435
- Maßstabinvariante Korrelationstheorie*, 358, 430
- McCluskey, E. J., 292, 435
- Meister Eckhart. Deutsche Werke Band I: Predigten*, 291, 430
- Melamed, Yitzhak Y., 278, 427
- Menger, Karl, 97, 435
- Menne, Albert, 194, 422
- Menzies, Peter, 63, 435
- Meyer, Robert K., 288, 439
- Mill, John Stuart, 191, 435
- Milman, Vitali D., 97, 99, 435
- Minimization of Boolean Functions**, 292, 435
- Mises, Richard v., 32, 435
- Misner, Charles W., 268, 269, 435
- Mittasch, Alwin, 348, 435
- Moivre, Abraham de, 66, 111, 112, 139, 435
- Morabia, Alfredo, 202, 435
- More Is Different*, 309, 419
- Naumov, Valeriy A., 421
- Neffe, Jürgen, 340, 435
- Negatio negationis als Paradigma in der Eckhartschen Dialektik*, 291, 442
- Negatio negationis: Problemgeschichtliche Aspekte einer Denkstruktur*, 291, 293, 429
- Negation*, 291, 293, 305, 419, 439
- Negation and quantification in aristotle*, 293, 443
- Negation in logic programming*, 291, 293, 433
- Neue Untersuchungen über die Mikroorganismen bei infektiösen Wundkrankheiten*, 59, 432
- Newstadt, Russell, 278, 291, 293, 436
- Newton, Isaac, 89, 414, 436
- Neyman, Jerzy, 122, 251, 436
- Nieuwenhuizen, Theodorus M., 71, 442
- nihil fit sine causa - Die Kausalität im Spanischen und Portugiesischen: DIPLOMARBEIT. Magister der Philosophie*, 331, 444
- Noordhof, Paul Jonathan Pitt, 32, 436
- Nordström, Gunnar, 144, 436
- Norton, John D., 144, 436
- Nota sobre o conceito de contradição*, 14, 288, 424
- Note on fuzzy languages*, 327, 433
- Nouveaux essais sur l'entendement humain*, 88, 433
- Oeuvres philosophiques latines & françoises de feu Mr. de Leibnitz*, 278, 433
- Okun, L. B., 316, 436
- Omnis Determinatio est Negatio: A Genealogy and Defense of the Hegelian Conception of Negation*, 278, 291, 293, 436
- On an Absolute Criterion for Fitting Frequency Curves*, 139, 426
- On Governors*, 261, 435
- On the Einstein Podolsky Rosen paradox*, 72, 73, 422
- On the Methods of Measuring Association Between Two Attributes*, 207, 444
- On the Notion of Cause*, 71, 439
- On the Notions of Causality and Complementarity*, 72, 422
- On the Principle of Contradiction in Aristotle*, 286, 434
- On the theory of inconsistent formal systems.*, 14, 288, 424
- On the Interpretation of Chi square from Contingency Tables, and the Calculation of P*, 178, 252, 427
- On the Relation between the Expansion and the Mean Density of the Universe*, 144, 426
- Opera quae supersunt omnia / iterum edenda curavit, praefationes, vitam auctoris, nec non notitias, quae ad historiam scriptorum pertinent*, 292, 295, 440
- Opuscula mathematica, philosophica et philologica. Collegit partimque*

- latine vertit ac recensuit Joh. Castillioneus*, 89, 436
- Ordinal Conditional Functions: A Dynamic Theory of Epistemic States*, 32, 441
- Pacioli, Luca, 80, 84, 436
- Pagano, Marcello, 220, 436
- Pais, A., 38, 436
- Para-consistent logic
- Ex contradictione sequitur quodlibet principle, 14
 - Principle of Explosion, 14
- Paraconsistent logic: consistency, contradiction and negation*, 288, 423
- Peano, Giuseppe, 86, 436
- Pearl, Judea, 32, 56, 60–62, 410, 436
- Pearson, Egon Sharpe, 122, 251, 436
- Pearson, Karl, 48–50, 52, 55–57, 113, 136, 139, 176, 177, 180, 207, 252, 436, 437, 444
- Pereboom, Derk, 34, 424
- Philosophiae naturalis principia mathematica*, 414, 436
- Philosophy of Probability. Foundations, Epistemology, and Computation*, 96, 443
- Planck, Max Karl Ernst Ludwig, 69, 405, 406, 437
- Plastino, A., 430
- Podolsky, Boris, 426
- Poincaré, Henri, 70, 437
- Poincaré, Jules Henri, 292, 437
- Popper, Karl Raimund, 9, 11, 13, 411, 438
- Post Hoc, Ergo Propter Hoc*, 59, 444
- Post, Emil Leon, 327, 438
- Postscripts to 'Causation'*, 63, 434
- Priest, Graham, 20, 288, 438
- Principium contradictionis*, 286, 445
- Principle of Explosion
- Da Costa, 14
 - Ilija Barukčić, 14
 - Quesada, 14
- Principles of biostatistics*, 220, 436
- Probabilistic Causality*, 64, 65, 425, 439
- Probabilistic Causation and Causal Processes: A Critique of Lewis*, 63, 435
- Probabilistic causation, preemption and counterfactuals*, 32, 436
- Probabilistic Geometry*, 97, 435
- Probabilistic Theories of Causality*, 63, 443
- Probability and Statistics*, 98, 134, 135, 138, 324, 424
- Prolegomena to any future metaphysics that will be able to come forward as science*, 33, 431
- Prolegomena zu einer jeden künftigen Metaphysik die als Wissenschaft wird auftreten können*, 33, 431
- Proof methods
- Modus inversus, 7, 20
 - Modus ponens, 14
 - Modus sine, 18
- Proposed Experiment to Test Local Hidden-Variable Theories*, 73, 424
- Pólya, Georg, 231, 437
- Quanten-Mechanik Und Wirklichkeit*, 67, 112, 425
- Quantitative fuzzy semantics*, 327, 444
- Quesada, Francisco Miró, 14, 288, 438
- R. A. Fisher in the 21st century (Invited paper presented at the 1996 R. A. Fisher Lecture)*, 136, 425
- Rèsolution d'une question relative aux déterminants*, 155, 428
- Rasprostranenie zakona bol'shikh chisel na velichiny, zavisyaschie drug ot drugar*, 226, 434
- Reality, objective, 23
- Recommended Standards for Statistical Symbols and Notation*, 139, 424
- Recordé, Robert, 80, 81, 84, 438
- Reichenbach, Hans, 32, 63, 70, 72, 339, 340, 405, 438
- Reichenbach, Hans (1891–1953), 63
- Reicin, A., 422
- Rescher, Nicholas, 12, 438
- Ricci-Curbastro, Gregorio, 143, 439

- Robertson, Connie, 13, 276, 439
 Robins, James M., 60, 439
 Rolle, Michel, 80, 84, 439
 Romano, Joseph P., 13, 439
 Rosen, Nathan, 426
 Ross, William David, 419
 Rota, Gian-Carlo, 97, 432
 Routley, Richard, 288, 439
 Royce, Josiah, 291, 293, 305, 439
 Russell, Bertrand, 71, 439
- Sachs, Lothar, 52, 134, 324, 409, 439
 Sadowsky, D. A., 202, 203, 207, 439
 Salmon, Wesley C., 64, 65, 439, 440
 Schaffer, Jonathan, 63, 440
Schaum's outline of theory and problems of tensor calculus, 145, 431
 Scheid, Harald, 134, 180, 252, 324, 440
 Scheines, Richard, 441
 Schervish, Mark J., 98, 134, 135, 138, 324, 424
 Schrödinger, E., 88, 406, 440
 Schröder, Rolf, 433
 Schur, J., 155, 440
Science and Hypothesis, 70, 437
Science of knowledge, 279, 426
Scientific explanation and the causal structure of the world, 65, 440
 Shapiro, D., 422
 Shimony, Abner, 424
 Shumway Robert H.; Stoffer, David S., 226, 440
 Siegel, A.F., 13, 439
Simplified Theory of Electrical and Optical Phenomena in Moving Systems, 103, 434
 Simpson, Thomas, 136, 440
Simultaneous measurement of non-commuting observables in entangled systems, 71, 442
 Sitter, Willem de, 144, 426
 Smith, John Alexander, 419
 Snell, James Laurie, 431
 Sober, E., 54, 58, 361, 440
 Solomon, Herbert, 99, 440
Some remarks on the genesis of scalar-tensor theories, 144, 428
 Sorensen, Roy A., 12, 440
- Speranza, J. L., 293, 440
Spinoza and German idealism, 292, 293, 440
 Spinoza, Benedictus De, 292, 295, 440
 Spirtes, Peter, 60, 441
 Spohn, Spohn, 32, 441
 Spohn, Wolfgang, 32, 441
Statins and death due to any cause – all doubts removed?, 167, 420
 Stephani, Hans, 144, 441
 Stiehler, Gottfried, 46, 441
 Stoyanov, Jordan M., 13, 441
Summa de arithmetica, geometria, proportioni et proportionalità, 80, 84, 436
 Suppes, Patrick, 32, 64, 112, 357, 441
Sur l'extension du théorème limite du calcul des probabilités aux sommes de quantités dépendantes, 226, 422
Sur la dynamique de l'électron, 292, 437
Système de la nature, ou des loix du monde physique et du monde moral, 25, 26, 44, 430
- Tarski, Alfred, 327, 434
The 1856 Weber-Kohlrusch Experiment (The Speed of Light), 80, 83, 441
The "Science of Logic" in Soviet Philosophy and a Reading in Hegelian Dialectics, 41, 432
The arrangement of field experiments, 202, 427
The causal relationship k, 110, 206, 219, 250, 251, 421
The Consistency and Ultimate Distribution of Optimum Statistics, 142, 430
The direction of time, 339, 340, 438
The environment and disease: association or causation?, 59, 430
The Ether and the Earth's Atmosphere, 292, 427
The genetical theory of natural selection, 142, 427
The Geometrization of the Electromagnetic Field, 70, 420

- The life and work of A.A. Markov*, 226, 421
- The Logic of Inductive Inference*, 202, 203, 427
- The logic of paradox*, 288, 438
- The Logic of Scientific Discovery. Logik der Forschung* first published 1935 by Verlag von Julius Springer, Vienna, Austria. First English edition published 1959 by Hutchinson & Co., 11, 13, 438
- The logical content of the risk ratio*, 201, 421
- The Meaning of Negation*, 291, 293, 429
- The meaning of relativity. Four lectures delivered at Princeton University, May, 1921*, 144, 426
- The n-dimensional pythagorean theorem*, 104, 444
- The norm of the Schur product operation*, 155, 424
- The philosophy of space & time*, 339, 438
- The probability of causation under a stochastic model for individual risk*, 60, 439
- The Probable Error of a Mean*, 139, 428
- The Relativistic Wave Equation*, 94, 316, 419
- The Second International Congress for the Unity of Science*, 72, 443
- The statistical association between smoking and carcinoma of the lung*, 202, 203, 207, 439
- The Statistics of Anti-Typhoid and Anti-Cholera Inoculations, and the Interpretation of Such Statistics in General*, 202, 206, 428
- The theory of relativity and the Pythagorean theorem*, 316, 436
- The whetstone of witte, whiche is the seconde parte of Arithmetike: containyng the extraction of Rootes: The Cobike practise, with the rule of Equation: and the woorkes of Surde Nombres*, 80, 81, 84, 438
- The World As I See It*, 164, 426
- The Development of Modus Ponens in Antiquity : From Aristotle to the 2nd Century AD*, 19, 422
- The Doctrine of Chances or a Method of Calculating the Probability of Events in Play*, 66, 111, 112, 435
- The Equivalence of Time and Gravitational Field*, 70, 250, 419
- The Grammar of Science*, 48, 55, 56, 437
- The Interior Logic of Inequalities*, 9, 10, 14, 18, 20, 22, 80, 85, 86, 88, 306, 417, 421
- The Mathematical Formula of the Causal Relationship k*, 50, 250, 420
- The Pythagorean Theorem: A 4,000-Year History*, 100, 434
- The P Value of likely extreme events*, 98, 169, 171, 173, 177, 183, 186, 190, 231, 233, 236, 239, 241, 243, 246, 420
- The Role of Axioms in Mathematics*, 274, 425
- The Wordsworth dictionary of quotations*, 13, 276, 439
- Theoria combinationis observationum erroribus minimis obnoxiae*, 136, 427
- Theoria Motus Corporum Coelestium in Sectionibus Conicis Solem Ambientum*, 139, 427
- Theoriae causalitatis principia mathematica*, 50, 88, 250, 420
- Thompson, Marry E., vii, 251, 441
- Thorne, Kip S., 435
- Thought Experiments*, 12, 440
- Thought Experiments in Science and Philosophy.*, 12, 423
- Time series analysis and its applications: with R examples*, 226, 440
- Tolman, Richard C., 316, 434, 441
- Tombe, Frederick, 80, 83, 441
- Toohy, John Joseph, 7, 441
- Toward a theory of fuzzy information granulation and its centrality in human reasoning and fuzzy logic*, 327, 444

- Traité d'algèbre ou principes généraux pour résoudre les questions de mathématique.*, 80, 84, 439
- Truth
 Albert Einstein, 7
 Ex contradictione sequitur quodlibet principle, 14
 Ideology in science, 6
 Ilija Barukčić, 6
 Thomas Aquinas, 5
- Tschébychef, Pafnouti Lvovitch, 121, 226, 321, 441
- Tsopurashvili, Tamar, 291, 442
- Twardy, Charles R., 65, 442
- Two Notes on Notation*, 92, 432
- Two Notes on the Probabilistic Approach to Causality*, 47, 65, 429
- Typical Laws of Heredity*, 49, 50, 52, 57, 427
- Ueber die Elektrizitätsmenge, welche bei galvanischen Strömen durch den Querschnitt der Kette fließt*, 80, 83, 443
- Ufuoma, Okoh, 85, 86, 88, 250, 251, 417, 421
- Ulyanov, Vladimir Ilyich, 41, 442
- Unified Field Theory*, 70, 94, 104, 250, 420
- Unknown, Author, 163, 442
- Uspensky, J. v., 21, 30, 113, 122, 126, 129, 217, 221, 442
- Van Heusden, Erik F. G., 71, 442
- Van Schooten, Frans, 121, 129, 131, 180, 252, 431
- Vatican, First Council, 412, 442
- Venetian Sea Levels, British Bread Prices, and the Principle of the Common Cause*, 54, 58, 361, 440
- Verworn, Max, 163, 442
- VII. On the association of attributes in statistics: with illustrations from the material of the childhood society, &c.*, 207, 444
- Voigt, Woldemar, 143, 292, 442
- Vollständige Anleitung zur Algebra. Erster Theil*, 89, 90, 426
- Volume VIII. Metaphysica*, 24, 286, 287, 295, 419
- Von den Miasmen und Contagien und von den miasmatisch-contagiösen Krankheiten*, 59, 429
- Von Engelhardt, Dietrich, 191, 442
- Von Neumann, John, 86, 124, 442
- Wahrscheinlichkeitsrechnung*, 134, 180, 252, 324, 440
- Wallis, Johannis, 88, 442
- Wallisii, Johannis, 88, 89, 443
- Walton, Douglas, 59, 444
- Was ist ein Naturgesetz?*, 406, 440
- Watkins, Eric, 27, 443
- Wave Propagation In Periodic Structures Electric Filters And Crystal Lattices First Edition*, 106, 127, 433
- Weber, W., 80, 83, 443
- Weber, W. E., 80, 83, 443
- Wedin, Michael V., 293, 443
- Wedin, Vernon, 286, 434
- Wenmackers, Sylvia, 96, 443
- Werkmeister, William H., 72, 443
- What if?: thought experimentation in philosophy*, 12, 438
- What is so Bad about Contradictions?*, 20, 288, 438
- Wheeler, John Archibald, 435
- Whitworth, William Allen, 121, 129, 131, 443
- Widmann, Johannes, 80, 84, 443
- Wiener, Norbert, 265, 443
- Williamson, Jon, 32, 63, 443
- Wilson, Robin J., 84, 443
- Wissenschaft der Logik. Erster Band. Die objektive Logik*, 40, 278, 292, 429
- Wissenschaft der Logik. Erster Band. Die objektive Logik. Zweytes Buch: Die Lehre vom Wesen*, 40, 44, 45, 278, 334, 335, 429
- Wissenschaft der Logik. Zweiter Band. Die subjective Logik oder Lehre vom Begriff*, 40, 278, 429
- Woods, John, 59, 444
- Woodward, James, 61, 429

- Wright, Sewall, 409, 410, 444
- X. *On the criterion that a given system of deviations from the probable in the case of a correlated system of variables is such that it can be reasonably supposed to have arisen from random sampling*, 176, 177, 437
- XXII. *Correlated averages*, 49, 425
- Yates, Frank, 141, 169, 171, 173, 176, 183, 186, 190, 239, 241, 243, 246, 444
- Yeng, Shwu, 104, 444
- Yule, G. Udny, 202, 206, 428
- Yule, George Udny, 207, 444
- Zadeh, Lotfi Aliasker, 327, 433, 444
- Zero and infinity Mathematics without frontiers*, 85, 86, 88, 250, 347, 417, 421
- Zero Divided by Zero Equals One*, 85, 86, 88, 306, 417, 420
- Zesar, Patrick Manuel, 331, 444
- Zum Studium des elektrischen Resonators*, 80, 83, 425
- Zur Elektrodynamik bewegter Körper*, 105, 126, 164, 292, 316, 425
- Zur Theorie der Gravitation vom Standpunkt des Relativitätsprinzips*, 144, 436
- Zur Quantenmechanik der Stoßvorgänge*, 125, 127, 128, 423
- Zwergel, Herbert A., 286, 445

