



## Relevance of logical positivism in contemporary western philosophy

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### Abstract

Logical positivism and logical empiricism, which together formed neopositivism, was a movement in Western philosophy whose central thesis was verificationism, a theory of knowledge which asserted that only statements verifiable through empirical observation are cognitively meaningful. The movement flourished in the 1920s and 1930s in several European centers. Efforts to convert philosophy to this new "scientific philosophy", shared with empirical sciences' best examples, such as Einstein's general theory of relativity, sought to prevent confusion rooted in unclear language and unverifiable claims. The Berlin Circle and Vienna Circle-groups of philosophers, scientists, and mathematicians in Berlin and Vienna—propounded logical positivism, starting in the late 1920s.

**Keywords:** logical positivism, philosophy, empiricism, knowledge

### Introduction

#### Influence

Logical positivists culled from Ludwig Wittgenstein's early philosophy of language the verifiability principle or criterion of meaningfulness. As in Ernst Mach's phenomenalism, whereby the mind knows only actual or potential sensory experience, verificationists took all sciences' basic content to be only sensory experience. And some influence came from Percy Bridgman's musings that others proclaimed as operationalism, whereby a physical theory is understood by what laboratory procedures scientists perform to test its predictions. In verificationism, only the *verifiable* was scientific, and thus meaningful (or *cognitively meaningful*), whereas the unverifiable, being unscientific, was meaningless "pseudo statements" (just *emotively meaningful*). Unscientific discourse, as in ethics and metaphysics, would be unfit for discourse by philosophers, newly tasked to organize knowledge, not develop new knowledge.

#### Definition

Logical positivism is sometimes stereotyped as forbidding talk of unobservables, such as microscopic entities or such notions as causality and general principles, but that is an exaggeration. Rather, most neopositivists viewed talk of unobservables as metaphorical or elliptical: direct observations phrased abstractly or indirectly. So *theoretical terms* would garner meaning from *observational terms* via *correspondence rules*, and thereby *theoretical laws* would be reduced to *empirical laws*. Via Bertrand Russell's logicism, reducing mathematics to logic, physics' mathematical formulas would be converted to symbolic logic. And via Russell's logical atomism, ordinary language would break into discrete units of meaning. Rational reconstruction, then, would convert ordinary statements into standardized equivalents, all networked and united by a logical syntax. A scientific theory would be stated with its method of verification, whereby a logical calculus or

empirical operation could verify its falsity or truth.

#### Development

In the late 1930s, logical positivists fled Germany and Austria for Britain and United States. By then, many had replaced Mach's phenomenalism with Otto Neurath's physicalism, whereby science's content is not actual or potential sensations, but instead is entities publicly observable. And Rudolf Carnap, who had sparked logical positivism in the Vienna Circle, had sought to replace *verification* with simply *confirmation*. With World War II's close in 1945, logical positivism became milder, *logical empiricism*, led largely by Carl Hempel, in America, who expounded the covering law model of scientific explanation. Logical positivism became a major underpinning of analytic philosophy, and dominated English-speaking world philosophy, including philosophy of science, while influencing sciences, but especially social sciences, into the 1960s. Yet the movement failed to resolve its central problems, and its doctrines were increasingly criticized, most trenchantly by W. V. O. Quine, Norwood Hanson, Karl Popper, Thomas Kuhn, and Carl Hempel.

#### Roots

##### Language

*Tractatus Logico-Philosophicus*, by the young Ludwig Wittgenstein, introduced the view of philosophy as "critique of language", offering the possibility of a theoretically principled distinction of intelligible versus nonsensical discourse. *Tractatus* adhered to a correspondence theory of truth (versus a coherence theory of truth). Wittgenstein's influence also shows in some versions of the verifiability principle. In tractarian doctrine, truths of logic are tautologies, a view widely accepted by logical positivists who were also influenced by Wittgenstein's interpretation of probability although, according to Neurath, some logical positivists found *Tractatus* to contain too much metaphysics.

## Logicism

Gottlob Frege began the program of reducing mathematics to logic, continued it with Bertrand Russell, but lost interest in this logicism, and Russell continued it with Alfred North Whitehead in their monumental *Principia Mathematica*, inspiring some of the more mathematical logical positivists, such as Hans Hahn and Rudolf Carnap. (Carnap's early anti-metaphysical works employed Russell's theory of types.) Carnap envisioned a universal language that could reconstruct mathematics and thereby encode physics. Yet Kurt Gödel's incompleteness theorem showed this impossible except in trivial cases, and Alfred Tarski's undefinability theorem shattered all hopes of reducing mathematics to logic. Thus, a universal language failed to stem from Carnap's 1934 work *Logische Syntax der Sprache (Logical Syntax of Language)*. Still, some logical positivists, including Carl Hempel, continued support of logicism.

## Empiricism

In Germany, Hegelian metaphysics was a dominant movement, and Hegelian successors such as F H Bradley explained reality by postulating metaphysical entities lacking empirical basis, drawing reaction in the form of positivism. Starting in the late 19th century, there was "back to Kant" movement. Ernst Mach's positivism and phenomenalism were a major influence.

## Principles

### Analytic/synthetic gap

Concerning reality, the necessary is a state true in all possible worlds—mere logical validity—whereas the contingent hinges on the way the particular world is. Concerning knowledge, the *a priori* is knowable before or without, whereas the *a posteriori* is knowable only after or through, relevant experience. Concerning statements, the *analytic* is true via terms' arrangement and meanings, thus a tautology—true by logical necessity but uninformative about the world—whereas the *synthetic* adds reference to a state of facts, a contingency.

In 1739, Hume cast a fork aggressively dividing "relations of ideas" from "matters of fact and real existence", such that all truths are of one type or the other. By Hume's fork, truths by relations among ideas (abstract) all align on one side (analytic, necessary, *a priori*), whereas truths by states of actualities (concrete) always align on the other side (synthetic, contingent, *a posteriori*). At any treatises containing neither, Hume orders, "Commit it then to the flames, for it can contain nothing but sophistry and illusion".

Thus awakened from "dogmatic slumber", Kant quested to answer Hume's challenge—but by explaining how metaphysics is possible. Eventually, in his 1781 work, Kant crossed the tines of Hume's fork to identify another range of truths by necessity—synthetic *a priori*, statements claiming states of facts but known true before experience—by arriving at transcendental idealism, attributing the mind a constructive role in phenomena by arranging sense data into the very experience *space, time, and substance*. Thus, Kant saved Newton's law of universal gravitation from Hume's problem of induction by finding uniformity of nature to be *a priori* knowledge. Logical positivists rejected Kant's synthetic *a priori*, and staked Hume's fork, whereby a statement is either

analytic and *a priori* (thus necessary and verifiable logically) or synthetic and *a posteriori* (thus contingent and verifiable empirically).

### Observation/theory gap

Early, most logical positivists proposed that all knowledge is based on logical inference from simple "protocol sentences" grounded in observable facts. In the 1936 and 1937 papers "Testability and meaning", individual terms replace sentences as the units of meaning. Further, theoretical terms no longer need to acquire meaning by explicit definition from observational terms: the connection may be indirect, through a system of implicit definitions.

### Cognitive meaningfulness

#### Verification

The logical positivists' initial stance was that a statement is "cognitively meaningful" only if some finite procedure conclusively determines its truth. By this verifiability principle, only statements verifiable either by their analyticity or by empiricism were *cognitively meaningful*. Metaphysics, ontology, as well as much of ethics failed this criterion, and so were found *cognitively meaningless*. Moritz Schlick, however, did not view ethical or aesthetic statements as cognitively meaningless. *Cognitive meaningfulness* was variously defined: having a truth value; corresponding to a possible state of affairs; naming a proposition; intelligible or understandable as are scientific statements.

Ethics and aesthetics were subjective preferences, while theology and other metaphysics contained "pseudo statements", neither true nor false. This meaningfulness was cognitive, although other types of meaningfulness—for instance, emotive, expressive, or figurative—occurred in metaphysical discourse, dismissed from further review. Thus, logical positivism indirectly asserted Hume's law, the principle that *is* statements cannot justify *ought* statements, but are separated by an unbridgeable gap. A J Ayer's 1936 book asserted an extreme variant—the boo/hooray doctrine—whereby all evaluative judgments are but emotional reactions.

#### Confirmation

In an important pair of papers in 1936 and 1937, "Testability and meaning", Carnap replaced *verification* with *confirmation*, on the view that although universal laws cannot be verified they can be confirmed. Later, Carnap employed abundant logical and mathematical methods in researching inductive logic while seeking to provide an account of probability as "degree of confirmation", but was never able to formulate a model. In Carnap's inductive logic, every universal law's degree of confirmation is always zero. In any event, the precise formulation of what came to be called the "criterion of cognitive significance" took three decades (Hempel 1950, Carnap 1956, Carnap 1961).

Carl Hempel became a major critic within the logical positivism movement. Hempel elucidated the paradox of confirmation.

#### Weak Verification

The second edition of A J Ayer's book arrived in 1946, and discerned *strong* versus *weak* forms of verification. Ayer

concluded, "A proposition is said to be verifiable, in the strong sense of the term, if, and only if, its truth could be conclusively established by experience", but is verifiable in the weak sense "if it is possible for experience to render it probable". And yet, "no proposition, other than a tautology, can possibly be anything more than a probable hypothesis". Thus, all are open to weak verification.

### Philosophy of Science

Upon the global defeat of Nazism, and the removal from philosophy of rivals for radical reform-Marburg neo-Kantianism, Husserlian phenomenology, Heidegger's "existential hermeneutics"-and while hosted in the climate of American pragmatism and commonsense empiricism, the neopositivists shed much of their earlier, revolutionary zeal. No longer crusading to revise traditional philosophy into a new *scientific philosophy*, they became respectable members of a new philosophy subdiscipline, *philosophy of science*. Receiving support from Ernest Nagel, logical empiricists were especially influential in the social sciences.

### Explanation

Comtean positivism had viewed science as *description*, whereas the logical positivists posed science as *explanation*, perhaps to better realize the envisioned unity of science by covering not only fundamental science-that is, fundamental physics-but the special sciences, too, for instance biology, anthropology, psychology, sociology, and economics. The most widely accepted concept of scientific explanation, held even by neopositivist critic Karl Popper, was the deductive-nomological model (DN model). Yet DN model received its greatest explication by Carl Hempel, first in his 1942 article "The function of general laws in history", and more explicitly with Paul Oppenheim in their 1948 article "Studies in the logic of explanation".

In DN model, the stated phenomenon to be explained is the *explanandum*-which can be an event, law, or theory-whereas premises stated to explain it are the *explanans*. Explanans must be true or highly confirmed, contain at least one law, and entail the explanandum. Thus, given initial conditions  $C_1, C_2, \dots, C_n$  plus general laws  $L_1, L_2, \dots, L_m$ , event  $E$  is a deductive consequence and scientifically explained. In DN model, a law is an unrestricted generalization by conditional proposition-*If A, then B*-and has empirical content testable. (Differing from a merely true regularity-for instance, *George always carries only \$1 bills in his wallet*-a law suggests what *must* be true, and is consequent of a scientific theory's axiomatic structure.)

By the Humean empiricist view that humans observe sequence of events, not cause and effect-as causality and causal mechanisms are unobservable-DN model neglects causality beyond mere constant conjunction, first event  $A$  and then always event  $B$ . Hempel's explication of DN model held natural laws-empirically confirmed regularities-as satisfactory and, if formulated realistically, approximating causal explanation. In later articles, Hempel defended DN model and proposed a probabilistic explanation, inductive-statistical model (IS model). DN model and IS model together form *covering law model*, as named by a critic, William Dray. (Derivation of statistical laws from other statistical laws goes

to deductive-statistical model (DS model).) Georg Henrik von Wright, another critic, named it *subsumption theory*, fitting the ambition of theory reduction.

### Unity of science

Logical positivists were generally committed to "Unified Science", and sought a common language or, in Neurath's phrase, a "universal slang" whereby all scientific propositions could be expressed. The adequacy of proposals or fragments of proposals for such a language was often asserted on the basis of various "reductions" or "explications" of the terms of one special science to the terms of another, putatively more fundamental. Sometimes these reductions consisted of set-theoretic manipulations of a few logically primitive concepts (as in Carnap's *Logical Structure of the World* (1928)). Sometimes, these reductions consisted of allegedly analytic or *a priori* deductive relationships (as in Carnap's "Testability and meaning"). A number of publications over a period of thirty years would attempt to elucidate this concept.

### Theory Reduction

As in Comtean positivism's envisioned unity of science, neopositivists aimed to network all special sciences through the covering law model of scientific explanation. And ultimately, by supplying boundary conditions and supplying bridge laws within the covering law model, all the special sciences' laws would reduce to fundamental physics, the fundamental science.

### Critics

After the Second World War's close in 1945, key tenets of logical positivism, including its atomistic philosophy of science, the verifiability principle, and the fact/value gap, drew escalated criticism. It was clear that empirical claims cannot be verified to be universally true. Thus, as initially stated, the verifiability criterion made universal statements meaningless, and even made statements beyond empiricism for technological but not conceptual reasons meaningless, which would pose significant problems for science. These problems were recognized within the movement, which hosted attempted solutions-Carnap's move to *confirmation*, Ayer's acceptance of *weak verification*-but the program drew sustained criticism from a number of directions by the 1950s. Even philosophers disagreeing among themselves on which direction general epistemology ought to take, as well as on philosophy of science, agreed that the logical empiricist program was untenable, and it became viewed as self-contradictory. The verifiability criterion of meaning was itself unverified. Notable critics were Nelson Goodman, Willard Van Orman Quine, Norwood Hanson, Karl Popper, Thomas Kuhn, J L Austin, Peter Strawson, Hilary Putnam, and Richard Rorty

### Retrospect

By the late 1960s, logical positivism had clearly run its course. Interviewed in the late 1970s, A J Ayer supposed that "the most important" defect "was that nearly all of it was false". Although logical positivism tends to be recalled as a pillar of scientism, Carl Hempel was key in establishing the philosophy subdiscipline philosophy of science <sup>[14]</sup> where

Thomas Kuhn and Karl Popper brought in the era of postpositivism. John Passmore found logical positivism to be "dead, or as dead as a philosophical movement ever becomes". Logical positivism's fall reopened debate over the metaphysical merit of scientific theory, whether it can offer knowledge of the world beyond human experience (scientific realism) versus whether it is but a human tool to predict human experience (instrumentalism). Meanwhile, it became popular among philosophers to rehash the faults and failures of logical positivism without investigation of it. Thereby, logical positivism has been generally misrepresented, sometimes severely. Arguing for their own views, often framed versus logical positivism, many philosophers have reduced logical positivism to simplisms and stereotypes, especially the notion of logical positivism as a type of foundationalism. In any event, the movement helped anchor analytic philosophy in the English-speaking world, and returned Britain to empiricism. Without the logical positivists, who have been tremendously influential outside philosophy, especially in psychology and social sciences, intellectual life of the 20th century would be unrecognizable.

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