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Chapter 1 : Problem of induction - Wikipedia

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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. Another member of Vienna Circle to later prove very influential was Carl Hempel. Carnap and other Vienna Circle members, including Hahn and Neurath , saw need for a weaker criterion of meaningfulness than verifiability. In the early s, Carnap debated Heidegger over "metaphysical pseudosentences". Logical positivism thus became dominant in the Anglosphere. Concerning knowledge , the a priori is knowable before or without, whereas the a posteriori is knowable only after or through, relevant experience. In , 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. In the and papers "Testability and meaning", individual terms replace sentences as the units of meaning. 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. This meaningfulness was cognitive, although other types of meaningfulnessâ€”for instance, emotive, expressive, or figurativeâ€”occurred in metaphysical discourse, dismissed from further review. Confirmation In an important pair of papers in and , "Testability and meaning", Carnap replaced verification with confirmation, on the view that although universal laws cannot be verified they can be confirmed. 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". Cn plus general laws L1, L2. Ln, event E is a deductive consequence and scientifically explained. A number of publications over a period of thirty years would attempt to elucidate this concept. It was clear that empirical claims cannot be verified to be universally true. 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. Quine Although quite empiricist, American logician Willard Van Orman Quine published the paper Two Dogmas of Empiricism , [36] which challenged conventional empiricist presumptions. Quine later proposed naturalized epistemology. Thus, any dataset â€”the direct observations, the scientific factsâ€”is laden with theory. Popper An early, tenacious critic was Karl Popper whose book Logik der Forschung, arriving in English in as The Logic of Scientific Discovery , directly answered verificationism. Popper heeded the problem of induction as rendering empirical verification logically impossible. Accepting scientific method as hypotheticodeduction , whose inference form is denying the consequent , Popper finds scientific method unable to proceed without falsifiable predictions. Popper thus identifies falsifiability to demarcate not meaningful from meaningless but simply scientific from unscientificâ€”a label not in itself unfavorable. Popper finds virtue in metaphysics , required to develop new scientific theories. And an unfalsifiableâ€”thus unscientific, perhaps metaphysicalâ€”concept in one era can later, through evolving knowledge or technology, become falsifiable, thus scientific. Explicitly denying the positivist view that all knowledge is scientific, Popper developed the general epistemology critical rationalism , which finds human knowledge to evolve by conjectures and refutations. Popper thus acknowledged the value of the positivist movement, driving evolution of human understanding, but claimed that he had "killed positivism". Kuhn With his landmark, The Structure of Scientific Revolutions , Thomas Kuhn critically destabilized the verificationist program, which was presumed to call for foundationalism. Actually, even in the s, Otto Neurath had argued for nonfoundationalism via coherentism by likening science to a boat that scientists must rebuild at sea[citation needed]. Something is referred to as "observational" if it is observable

directly with our senses. Then an observation term cannot be applied to something unobservable. If this is the case, there are no observation terms. Some theoretical terms refer primarily to observation terms. Reports of observation terms frequently contain theoretical terms. Retrospect By the late s, logical positivism had clearly run its course. 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. Cambridge University Press, , p xiv. Retrieved 30 June The upshot is that the positivists seem caught between insisting on the V. Schlick, Carnap, and Neurath New York: Garland Publishing, , p North Holland, , pp â€" Free Press, , pp 60â€" Oxford University Press, , pp Sarkar, S; Pfeifer, J The Philosophy of Science: A Tapestry of Philosophical Traditions: A Tapestry of Philosophical Traditions, 6th edn Boston: University of Chicago Press, , pp The Stanford Encyclopedia of Philosophy Summer ed. It would fall to Hempel to become perhaps the most astute critic of that movement and to contribute to its refinement as logical empiricism Hempel himself attained a certain degree of prominence as a critic of this movement By this standard, sentences that are non-analytic but also non-verifiable, including various theological or metaphysical assertions concerning God or The Absolute, qualify as cognitively meaningless. This was viewed as a desirable result. But, as Hempel would demonstrate, its scope was far too sweeping, since it also rendered meaningless the distinctively scientific assertions made by laws and theories Within logical positivism, observation language was assumed to consist of names and predicates whose applicability or not can be ascertained, under suitable conditions, by means of direct observation Karl Popper , , however, would carry the argument in a different direction by looking at the ontic nature of properties Hempel , , meanwhile, demonstrated that the verifiability criterion could not be sustained. Since it restricts empirical knowledge to observation sentences and their deductive consequences, scientific theories are reduced to logical constructions from observables. In a series of studies about cognitive significance and empirical testability, he demonstrated that the verifiability criterion implies that existential generalizations are meaningful, but that universal generalizations are not, even though they include general laws, the principal objects of scientific discovery. Hypotheses about relative frequencies in finite sequences are meaningful, but hypotheses concerning limits in infinite sequences are not. The verifiability criterion thus imposed a standard that was too strong to accommodate the characteristic claims of science and was not justifiable Both theoretical and dispositional predicates, which refer to non-observables, posed serious problems for the positivist position, since the verifiability criterion implies they must be reducible to observables or are empirically meaningless At least two of its defining tenets had been shown to be without merit. Hempel suggested multiple criteria for assessing the cognitive significance of different theoretical systems, where significance is not categorical but rather a matter of degree Precisely what remained, however, was in doubt. The precise outlines of its philosophical successor, which would be known as "logical empiricism", were not entirely evident. Perhaps this study came the closest to defining its intellectual core. Continuum, , pp 61â€" Cornell University Press, , p An Encyclopedia, Volume 1: D Reidel Publishing, Unity of science and the rejection of metaphysics". Edward N Zalta, ed. The Stanford Encyclopedia of Philosophy Fall ed. This initial formulation of the criterion was soon seen to be too strong; it counted as meaningless not only metaphysical statements but also statements that are clearly empirically meaningful, such as that all copper conducts electricity and, indeed, any universally quantified statement of infinite scope, as well as statements that were at the time beyond the reach of experience for technical, and not conceptual, reasons, such as that there are mountains on the back side of the moon. These difficulties led to modification of the criterion: The latter to allow empirical verification if not in fact then at least in principle, the former to soften verification to empirical confirmation. What Carnap later called the "liberalization of empiricism" was underway and different camps became discernible within the Circle Everybody had noted that the Wittgensteinian verificationist criterion rendered universally quantified statements meaningless. His abandonment of conclusive verifiability is indicated only in Schlick a. A second element that began to do so soon was the recognition of the problem of the irreducibility of disposition terms to observation terms A third element was that disagreement arose as to whether the

in-principle verifiability or support turned on what was merely logically possible or on what was nomologically possible, as a matter of physical law etc. A fourth element, finally, was that differences emerged as to whether the criterion of significance was to apply to all languages or whether it was to apply primarily to constructed, formal languages. Schlick retained the focus on logical possibility and natural languages throughout, but Carnap had firmly settled his focus on nomological possibility and constructed languages by the mid-thirties. Concerned with natural language, Schlick , a deemed all statements meaningful for which it was logically possible to conceive of a procedure of verification; concerned with constructed languages only, Carnap deemed meaningful only statements for whom it was nomologically possible to conceive of a procedure of confirmation of disconfirmation. Many of these issues were openly discussed at the Paris congress in Already in Carnap had sought to sharpen his previous criterion by stipulating that those statements were meaningful that were syntactically well-formed and whose non-logical terms were reducible to terms occurring in the basic observational evidence statements of science. It was not until one of his Paris addresses, however, that Carnap officially declared the meaning criterion to be mere confirmability. Though plausible initially, the device of introducing non-observational terms in this way gave rise to a number of difficulties which impugned the supposedly clear distinctions between logical and empirical matters and analytic and synthetic statements Hempel Independently, Carnap himself soon gave up the hope that all theoretical terms of science could be related to an observational base by such reduction chains. This admission raised a serious problem for the formulation of a meaning criterion: Harvard University Press, OUP , , p 23]. The Oxford Companion to Philosophy. Routledge History of Philosophy.

Chapter 2 : Carl Hempel: free download. Ebooks library. On-line books store on Z-Library

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Edit The physicist and philosopher Moritz Schlick , one of the first philosophers interested in the theory of relativity. He taught at the University of Vienna , where he held the chair of theory of inductive science. In Vienna, he organized the discussion group known as the Vienna Circle. Schlick can be regarded as the father of logical positivism, both for his organizational skills and for his philosophical ideas. He formulated the verifiability principle. Rudolf Carnap , one of the major philosophers of the twentieth century, a leading exponent of logical positivism, and co-author of the Vienna Circle manifesto. He made contributions to the philosophy of science , the philosophy of language , the theory of probability , and classical, inductive and modal logic. Since ordinary language is ambiguous, Carnap asserted the necessity to study philosophical issues in artificial languages, governed by the rules of logic and mathematics. In such languages he dealt with problems like the meaning of a statement , the distinction between analytic and synthetic , a priori and a posteriori , necessity and contingency , the different interpretations of probability , and the nature of explanation. His article with A. A New Movement in European Philosophy" in The Journal of Philosophy, was one of the first reports on logical positivism published in the United States, and promoted the spread of logical positivism. He taught at the University of Iowa and at the University of Minnesota , where in he founded the Minnesota Center for the Philosophy of Science, the oldest center for the philosophy of science in the world. He taught at Harvard University and wrote about the theory of relativity. He proved that the continuum hypothesis is consistent with the axioms of classical set theory. The philosopher and sociologist Otto Neurath , who played an important role in the development of logical positivism. He was co-author of the manifesto of the Vienna Circle it is supposed that he was indeed the principal author , planned and directed the International Encyclopedia of Unified Science, was an editor of the journal Erkentnnis and of the series Unified Science, and founded and directed the International Foundation for Visual Education. The philosopher Friedrich Waismann , who was one of the few members of the Vienna Circle admitted to the meetings with Wittgenstein. He taught philosophy of mathematics and philosophy of science at the University of Cambridge and at the University of Oxford. Germany and the Berlin Circle Edit In Germany, members of the Berlin Circle contributed in an essential way to the development of logical empiricism: The physicist and philosopher Hans Reichenbach , the founder of the Berlin Circle. He is one of the fathers of the frequency interpretation of probability. He taught physics at Technische Hochschule in Stuttgart , philosophy of physics at the University of Berlin ; he was chief of the department of philosophy at the University of Istanbul ; he taught philosophy at the University of California at Los Angeles. He wrote about the philosophical meaning of the theory of relativity , which he studied under the teaching of Albert Einstein , and quantum mechanics. The logician and philosopher Kurt Grelling , a victim of Nazism ; it is supposed that he died with his wife in the Auschwitz concentration camp in , although it also has been reported that Grelling was killed in at the border between France and Spain while he was trying to escape in Spain. Grelling was a teacher in secondary school and was interested in logical problems. A semantic paradox is named after him, the Grelling paradox , formulated in] by Grelling and Leonard Nelson. The philosopher Carl Gustav Hempel , a leading member of logical positivism. He contributed to the International Encyclopedia of Unified Science. He is well-known for his studies on the logic of confirmation and explanation. Scandinavia Edit As early as Scandinavian philosophers were interested in logical positivism. Finnish Eino Kaila employed for the first time the expression "logical neopositivism" for denoting the new philosophical movements E. Eino Kaila published in a work pervaded by the principles of logical positivism The human knowledge, in Finnish. He taught philosophy at the University of Helsinki. Among his students was Georg Henrik von Wright , who published a study about logical positivism The Logical Empiricism, , in Finnish. Wright contributed to the development of modal logic and deontic logic. In Norway , the young Arne Naess was strongly influenced by logical positivism, especially so

in his doctorate Erkenntnis und wissenschaftliches Verhalten This lead to a forceful postivist bent for parts of Norwegian philosophy. United Kingdom Edit English philosopher Alfred Jules Ayer played an important role in the spread of logical positivism. His work Language, Truth and Logic gained immediate success. In that book, he completely accepted both the verifiability principle and the distinction between analytic and synthetic statements; hence he asserted that metaphysical sentences are meaningless. Poland Edit Logical positivism had extensive contacts with the group of Polish logicians who developed several branches of contemporary logic. Polish philosophy was greatly influenced by Kazimierz Twardowski , who studied at the University of Vienna and taught at Lwow ; he is the founder of Polish analytic philosophy. He taught several Polish philosophers and logicians. He contributed to Erkenntnis, the journal of logical positivism, edited by Carnap and Reichenbach. Kazimierz Ajdukiewicz , who taught philosophy of language , epistemology and logic , and contributed to Erkenntnis. Italy Edit Relations between Italian philosophy and logical positivism developed in the early stages of logical positivism. The Italian mathematician and philosopher of science Federigo Enriques took part in the congresses on scientific philosophy and collaborated on the International Encyclopedia, and Neurath and Carnap contributed articles to the journal Scientia edited by Enriques. In , Ludovico Geymonat published a work on logical positivism: La Nuova Filosofia della Natura in Germania. Geymonat had the opportunity to study with Schlick, Reichenbach, Carnap, and Waismann. He later held the first chair in Italy of philosophy of science. The interest of Italian philosophy in logical positivism was primarily directed towards historical research. Francesco Barone distinguished himself with his work Il Neopositivismo Logico, , a detailed and up-to-date historical and philosophical analysis of logical positivism. Criticism and influences Edit Early critics of logical positivism said that its fundamental tenets could not themselves be formulated in a way that was clearly consistent. The verifiability criterion of meaning did not seem verifiable; but neither was it simply a logical tautology , since it had implications for the practice of science and the empirical truth of other statements. This presented severe problems for the logical consistency of the theory. Another problem was that, while positive existential claims "there is at least one human being" and negative universals "not all ravens are black" allow for clear methods of verification find a human or a non-black raven , negative existential claims and positive universal claims do not allow for verification. Universal claims could apparently never be verified: This led to a great deal of work on induction, probability, and "confirmation", which combined verification and falsification. Karl Popper , a well-known critic of logical positivism, published the book Logik der Forschung in translated by himself as The Logic of Scientific Discovery published In it he presented an influential alternative to the verifiability criterion of meaning, defining scientific statements in terms of falsifiability. He did not hold that metaphysical statements must be meaningless; neither did he hold that a statement that in one century was "metaphysical" while unfalsifiable like the ancient Greek philosophy about atoms , could not in another century become "falsifiable" and thus "scientific". About psychoanalysis he thought something similar: He was, in general, more concerned with scientific practice than with the logical issues that troubled the positivists. Negative existential claims "there are no unicorns" and positive universals "all ravens are black" can be falsified, but positive existential and negative universal claims cannot, although Popper thought himself these could be deemed as verifiable [19]. Secondly, a theory of language and mathematical logic were created to answer what it really means to make statements like "all ravens are black". A response to the second criticism was provided by A. Ayer in Language, Truth and Logic, in which he sets out the distinction between "strong" and "weak" verification. However, the weak sense of verification states that a proposition is "verifiable After establishing this distinction, Ayer goes on to claim that "no proposition, other than a tautology , can possibly be anything more than a probable hypothesis " Ayer This defense was controversial among logical positivists, some of whom stuck to strong verification, and claimed that general propositions were indeed nonsense. Subsequent philosophy of science tends to make use of certain aspects of both of these approaches. Quine criticized the distinction between analytic and synthetic statements and the reduction of meaningful statements to immediate experience. Work by Thomas Kuhn has convinced many that it is not possible to provide truth conditions for

science independent of its historical paradigm. But even this criticism was not unknown to the logical positivists: Otto Neurath compared science to a boat which we must rebuild on the open sea. Logical positivism was essential to the development of early analytic philosophy. It was disseminated throughout the European continent and, later, in American universities by the members of the Vienna Circle. Ayer is considered responsible for the spread of logical positivism to Britain. The term subsequently came to be almost interchangeable with "analytic philosophy" in the first half of the twentieth century. Logical positivism was immensely influential in the philosophy of language and represented the dominant philosophy of science between World War I and the Cold War. Many subsequent commentators on "logical positivism" have attributed to its proponents a greater unity of purpose and creed than they actually shared, overlooking the complex disagreements among the logical positivists themselves. Psychology and emerging conceptions of knowledge as unitary. Wann ed Behaviorism and Phenomenolgy pp Chicago: Behaviourism and logical positivism.: A reassessment of the alliance. Karl Popper might also be included, since despite his rejection of the term his method has much in common with the analytic tradition. Logical Empiricism at its Peak: Schlick, Carnap, and Neurath. Cambridge University Press, Moritz Schlick, a key figure in the logical positivist movement, did not believe ethical or aesthetic sentences to be cognitively meaningless. University of Chicago Press,

Chapter 3 : Works by Carl Gustav Hempel - PhilPapers

Carl Gustav Hempel was a leading figure of the logico-empiricist movement, originating in the 20s of the last century in Vienna and Berlin. He is particularly famous for his work on scientific.

His work is primarily associated with the concept of deductive-nomological explanation and with the Raven paradox. The papers include biographical material, correspondence, research and lecture manuscripts, teaching documents, and offprints by him and others, mostly stemming from his post-immigration period in the U. Digital reproductions of this collection are available online. In , he participated in a congress on scientific philosophy where he met Rudolf Carnap. After returning to Berlin, he earned his Ph. The same year, Hempel and his first wife Eva left the increasingly repressive Germany and emigrated to Belgium, with the help of Paul Oppenheim, with whom he co-authored the book Der Typusbegriff im Lichte der neuen Logik in After three years of private research and writing, Hempel emigrated to the U. During his Yale period, Hempel also spent a semester as a Visiting Professor at Columbia University in the fall of , as a Hibben Research Fellow at Princeton in the spring of , and a year as a Visiting Professor at Harvard University in He came to the University of Pittsburgh in as a University Professor of Philosophy and stayed until , when he returned to Princeton. Hempel was a philosopher of science who played a central role in the development of logical positivism or logical empiricism. In , Hempel developed with Paul Oppenheim a logically precise theory known as the Deductive-Nomological, or Covering Law, Model of Explanation, which sees scientific laws and theories as systematizing otherwise unwieldy bodies of particular empirical claims. To deal with probabilistic explanation, Hempel articulated an Inductive-Statistical Model in He also developed models of historical and functional explanation in the biological and social sciences, as well as of historical explanation. Those models shaped all subsequent work on scientific explanation. Hempel also sought to describe the conditions under which particular reports of observation may be said to confirm general hypothesis. His famous Raven Paradox exemplifies the logical challenge: Since the hypothesis 1 "All ravens are black" can be reformulated equivalently as 2 "All non-black things are non-ravens," the report of non-black non-ravens e. Hempel then proposed a quantitative method for determining the degree of confirmation of any hypothesis by particular statements of evidence. Hempel was author of the influential books Aspects of Scientific Explanation and Other Essays in the Philosophy of Science and Philosophy of Natural Science, which have been translated into ten languages. He held Guggenheim and Fulbright fellowships and served as a fellow at the Center for Advanced Study in the Behavioral Sciences at Stanford and as an honorary research fellow in philosophy at University College, London. The majority of the material was organized by Hempel according to various filing systems. Whenever possible, the original order has been maintained. The greater part of the papers is in English, but a considerable amount is also in German, and a few items are in French. The majority of the documents, however, stem from his post-immigration period in the U. The papers are divided into five series. The correspondence series extends from the s to the s, with the bulk of the material concentrating on the years The correspondence is subdivided into general correspondence; exchanges between Hempel, Paul Oppenheim, and Kurt Grelling; contacts between Hempel, Oppenheim, and other correspondents; family correspondence; and letters of recommendation, which are currently closed to research access. Manuscripts on both the Carus and Gavin David Young lectures are contained in two separate subseries. It also features a few dissertations and administrative documents. Please note that due to the sensitive and confidential nature of some of the material, access to this series is restricted. Finally, the offprints series is divided into offprints authored by Hempel and offprints authored by others. Most of them contain handwritten annotations and dedications to Hempel, and some prominent authors in the field are featured. More detailed scope and content notes are available at the series level:

DOWNLOAD PDF CARL GUSTAV HEMPEL: PRAGMATIC EMPIRICIST GEREON WOLTERS

Chapter 4 : 'The Methods of the Tractatus: Beyond Positivism and Metaphysics? | David Stern - calendrierc

1 Hempel, Carl Gustav () Gereon Wolters UniversitÃ¤t Konstanz FB Philosophie, Fach D 15 D Konstanz Germany Phone: (0) (office) (home) Fax (office) 2 Hempel, Carl Gustav () Carl Gustav Hempel was a leading figure of the logico-empiricist movement that dominated much of American.

John Earman and John T. Roberts advocate a challenging and radical claim regarding the semantics of laws in the special sciences: In this paper, we raise two objections against the attempt to cash out the content of special science generalizations in statistical terms. Show Context Citation Context The discussion between foundationalism and coherentism has been around for a long time, but for about two decades it has, in a way, become more serious than before, currently forming one of the central epistemological issues. It starts from the wellknown justification trilemma which runs as follows: The Completion of Logical Empiricism: This talk has two related aims. First of all, I would like to add Carl Gustav Hempel to the founding fathers of scientific philosophy, hereby creating at least a secular trinity of Carnap, Reichenbach and Hempel. Carnap takes French as an example here. Normic laws have the form "if A, then normally B". While ceteris paribus laws CP-laws have been frequently discussed by philosophers, it has not been sufficiently considered that distinct kinds of CP-laws exist in science with rather dif-ferent meanings. We distinguish between 1. There exist also mixed CP-laws, which contain a comparative and an exclusive CP-clause. Exclu-sive CP-laws may be either 2. While CP-laws of kind 2. CP-laws of kinds 1 may be both deductivistic or probabilistic. All these kinds of CP-laws have empirical content by which they are testable, except CP-laws of kind 2. Typically, CP-laws of kind 1 express claims about invariant correlations, CP-laws of kind 2. To avoid misunderstandings, we need a clarification of our notion of "exception". With a strict exception to a law L I mean a true singular basic Normic Laws as System Laws: There is continuous exchange of energy and matter between system and environment. Roberts defend the view that the laws of fundamental physics are expressed by univer-sal generalizations. These fundamental physical laws, Earman and Roberts argue, are strict laws and not qualified by ceteris paribus clauses. As physics, the special sciences

Chapter 5 : Carl Gustav Hempel & Pragmatic Empiricist, Gereon Wolters university ofkonstanz - PhilPaper

1 MÃ¼nchen, Oktober The Completion of Logical Empiricism: Hempel's Pragmatic Turn by Gereon Wolters (Konstanz) I. Introduction This talk has two related aims.

Logical positivism Save 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 s and s in several European centers. In verificationism, only the verifiable was scientific, and thus meaningful or cognitively meaningful , whereas the unverifiable, being unscientific, were meaningless "pseudostatements" 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. Definitions 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: So theoretical terms would garner meaning from observational terms via correspondence rules, and thereby theoretical laws would be reduced to empirical laws. 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. Rudolf Carnap , who had sparked logical positivism in the Vienna Circle, had sought to replace verification with simply confirmation. Logical positivism became a major underpinning of analytic philosophy ,[3] and dominated philosophy in the English-speaking world , including philosophy of science , while influencing sciences, but especially social sciences, into the s. Yet the movement failed to resolve its central problems,[4][5][6] and its doctrines were increasingly criticized, most trenchantly by Willard Van Orman 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. Another member of Vienna Circle to later prove very influential was Carl Hempel. Carnap and other Vienna Circle members, including Hahn and Neurath , saw need for a weaker criterion of meaningfulness than verifiability. In the early s, Carnap debated Heidegger over "metaphysical pseudosentences". Ayer saw his Language, Truth and Logic , written in English, import logical positivism to the English-speaking world. Logical positivism thus became dominant in the English-speaking world. Concerning knowledge , the a priori is knowable before or without, whereas the a posteriori is knowable only after or through, relevant experience. In , David 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. In the and papers "Testability and meaning", individual terms replace sentences as the units of meaning. 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. This meaningfulness was cognitive, although other types of meaningfulnessâ€”for instance, emotive, expressive, or figurativeâ€”occurred in metaphysical discourse, dismissed from further review. Confirmation In an important pair of papers in and , "Testability and meaning", Carnap replaced verification with confirmation, on the view that although universal laws cannot be verified they can be confirmed. Weak verification The second edition of A. 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". C plus general laws L, L. L, event E is a deductive consequence and scientifically explained. A number of publications over a period of thirty years would attempt to elucidate this concept. It was clear that empirical claims cannot be verified to be

universally true. 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. Quine Although quite empiricist, American logician Willard Van Orman Quine published the paper " Two Dogmas of Empiricism ",[37] which challenged conventional empiricist presumptions. Quine later proposed naturalized epistemology. Thus, any dataset â€"the direct observations, the scientific factsâ€"is laden with theory. Popper An early, tenacious critic was Karl Popper whose book Logik der Forschung, arriving in English in as The Logic of Scientific Discovery , directly answered verificationism. Accepting scientific method as hypotheticodeduction , whose inference form is denying the consequent , Popper finds scientific method unable to proceed without falsifiable predictions. Popper thus identifies falsifiability to demarcate not meaningful from meaningless but simply scientific from unscientificâ€"a label not in itself unfavorable. Popper finds virtue in metaphysics , required to develop new scientific theories. And an unfalsifiableâ€"thus unscientific, perhaps metaphysicalâ€"concept in one era can later, through evolving knowledge or technology, become falsifiable, thus scientific. Explicitly denying the positivist view that all knowledge is scientific, Popper developed the general epistemology critical rationalism , which finds human knowledge to evolve by conjectures and refutations. Popper thus acknowledged the value of the positivist movement, driving evolution of human understanding, but claimed that he had "killed positivism". Kuhn With his landmark, The Structure of Scientific Revolutions , Thomas Kuhn critically destabilized the verificationist program, which was presumed to call for foundationalism. Something is referred to as "observational" if it is observable directly with our senses. Then an observation term cannot be applied to something unobservable. If this is the case, there are no observation terms. Some theoretical terms refer primarily to observation terms. Reports of observation terms frequently contain theoretical terms. Retrospect By the late s, logical positivism had become exhausted. Ayer supposed that "the most important" defect "was that nearly all of it was false". 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.

Chapter 6 : Uneasy Homecoming: Philosophy of Science in Germany

This talk has two related aims. First of all, I would like to add Carl Gustav Hempel to the founding fathers of scientific philosophy, hereby creating at least a secular trinity of Carnap, Reichenbach and Hempel. Second, I would like to add "pragmatic " considerations as an integral part of.

The two authors go on to spell out several additional requirements for explanation, divided into two groups. But Hempel acknowledged quickly that in science there are explanations based on statistical or probabilistic laws as well. In many of them the explanandum is not a deductive consequence of the explanans, but it follows only with a certain probability. Why did it have such an impact? Yet there were more philosophical reasons as well, including the following: One benefit of the CL model, in the eyes of many, was to secure its objectivity and rationality. There was an explicit proposal regarding the nature of scientific 4 scientific laws was carefully crafted to get around Humean scruples concerning the notion of causation, as shared by many empiricists. In both respects, the approach was perceived as leading to substantive philosophical progress. It was not just among philosophers that the CL model was noted and admired. The model also exerted a significant influence on other disciplines, such as history and some of the social sciences. In those contexts it was taken to be normative, i. Within the philosophy of science doubts about the CL model also started to emerge. These examplesâ€”many of which became classics in themselves the flagpole, the moon and tides, syphilis and paresis, etc. It elicited alternative analyses. The temptation to say that there is no such a thing as scientific explanation seems to have vanished. Hempel had applications to history in mind from early on; cf. Some of its earliest and longest lasting criticisms concern that application. Montague, and others in Salmon , chapter 2. Salmon , chapters , and Fetzer a. In some respects these were not outright rejections of the CL model but modifications of it especially the unification model. However, more radical alternatives also appeared, e. Some would even argue that it is misguided to look for a universal model in the first place and that what is needed, instead, is a plurality of models, since explanations come in a variety of different forms. Often the attitude with respect to that model, especially by critics, appears to be the following: What Hempel and Oppenheim did, in their classic essay and elsewhere, was to start with some representative examples of scientific accounts by Kepler, Galilei, Newton, Einstein, etc. If successful, this procedure would have provided us with an analysis of the notion of explication in a very strong sense: Salmon , chapter 3, and Fetzer a. For a more general overview, see also, e. This is, then, what the significance of the CL model is typically taken to amount to. It is just that the analysis it embodies does not work, as the counterexamples are supposed to have shown. Two different reactions to the resulting situation are possible. First, one can hold on to the goal of providing a reductive analysis, and in particular, of articulating necessary and sufficient conditions for explanation. That would not necessarily mean that we have to give up analyzing the notion of explanation; but we should, so the suggestion here, proceed in a non-reductive, contextual way. Now, these two kinds of reactions are not only quite different, they are opposed to each other. Or more generally, it is assumed that the model has been refuted by the careful description of scientific practice. However, do the standard criticisms of the CL model really refute it so directly? First doubts may arise when one takes seriously Hempelian remarks such as the following: Their purpose is rather to indicate in reasonably precise terms the logical structure and the rationale of various ways in which empirical science answers explanationseeking why-questions. The construction of our models therefore involves some measure of abstraction and of logical schematization Hempel , For further discussion of the latter point, cf. If the model is taken to provide a reductive analysis of explanation, as is usual, one misrepresents its nature and purpose more fundamentallyâ€”or so the argument I want to consider next. But if the CL model is not meant to constitute a reductive analysis, how else could we think about it? I will consider a second, different answer later in the essay as well. As he writes in the former: The task of making more exact a vague or not quite exact concept used in everyday life or in an earlier stage of scientific or logical development, or rather of replacing it by a newly constructed, more exact concept,

belongs among the most important tasks of logical analysis and logical construction. We call this the task of explicating, or of giving an explication for, the earlier concept; this earlier concept, or sometimes the term used for it, is called the explicandum; and the new concept, or its term, is called an explicatum of the old one Carnap , ; original emphasis. But beyond that, descriptive accuracy is rejected, or downplayed, in an even stronger sense. Here Carnap points to the fact that the main thrust in giving an explication, in his sense, is revisionary and normative rather than descriptive. And this makes it significantly different from reductive analysis. Two closely related aspects of the relevant difference are the following: Second and more positively, what the new notion should be judged by instead is its usefulness. As Carnap writes in Logical Foundations of Probability: Strictly speaking, the question whether the solution [the explicatum, thus the explication overall] is right or wrong makes no good sense because there is no clear-cut answer. The 8 question should rather be whether the proposed solution is satisfactory, whether it is more satisfactory than another one, and the like Carnap , 4. Shortly after this passage Carnap list four main criteria for evaluating an explicatum: Returning to Hempel, there are a number of reasons for seeing the CL model, as well as his approach more generally, as an instance of Carnapian explication. To begin with, many of the features distinctive of explication are present, e. In addition, Hempel mentions Carnap and the notion of explication positively in some of his later reflections on his work Hempel , Finally, other central participants in the ensuing debate about the CL model describe the underlying approach in Carnapian terms; thus Salmon writes: What exactly follows about that model, especially concerning how to evaluate it? Moreover, the only guidance with which he provides us in this connection is the following: An indication of the meaning with the help of some examples for its intended use and other examples for uses not now intended can help the understanding. An informal explanation in general terms may be added Carnap , 1. Now, if that is the underlying assumption, another question arises: What exactly is the purpose, or what are the purposes, in play here? Neither Hempel nor Carnap are very explicit in that connection nor are many of their followers. This is partly because a thorough discussion of goals, thus of teleology and normativity, would not fit well into their empiricist framework, partly also, presumably, because an open-ended variety of goals is at issue. Yet specifying the relevant goal or goals is crucial for present purposes. Let us assume, for example, that the primary goal in employing the CL model is the characterization of scientific practice, after all. On the other hand, the force of the usual criticisms appears to be considerably weaker if what we are aiming at is one of the following: After all, might the right kind of similarity not play an important role for the effectiveness of the explicatum, as it takes over the role of the explicandum, in science? And might it not be crucial in philosophy too, depending on which particular questions we ask there? Let us suppose that, at least for some explications, questions about their descriptive accuracy, about the appropriateness of idealizations, etc. Arguably it is still the case that a Carnapian explication cannot be refuted by examples in any strict sense, because it is not meant to be right or wrong, only more or less useful, as we saw. This applies to the CL model, at least in contexts where the description of scientific practice is not our main goal. Assume here, as is usual nowadays, that one or several of the counter-models are superior, in one way or another. This leaves us with the question: Why are we still talking about the CL model at all, i. Salmon , Psillos , etc. As Philip Kitcher puts it: And with the current situation in the explanation debate in mind, he adds: In passages such as these, the CL model is put forward as exemplary for how philosophy of science, or analytic philosophy more generally, is to be done. Likewise, but with an opposite valence, one can try to use the CL model for illustrating the limitations of analytic philosophy, of formally oriented approaches more generally, or of Carnapian explication in particular, at least if they are understood too narrowly Reck Finally, might it even be possible to argue that, by locating generality at the core of explanation, there is something right about the CL model, something to be rescued, even if Hempel articulated it in a misleading way? Now I want to turn the tablesâ€”at least to some degree or in a certain sense. That is to say, I want to challenge, or at least to refine significantly, a Carnapian interpretation of the CL model. In the end the situation is more complex and more interesting, both with respect to Hempel and the CL model. Let us start with Hempel. A first observation in that connection is that, while Hempel was indeed close to Carnap at certain points in his

career, including in the late s and the s, there were other influences on him too. Hempel met Carnap in , while spending a semester in Vienna as a student. But not only Carnap had an impact on him then, other members of the Vienna Circle did so too, especially Otto Neurath Friedman , Wolters In that context he states the following about the goals and the methodology of the philosophy of science: But maybe that is reading too much into the passage. But actually, even in his earlier, classic work on explanation Hempel displays a significant amount of attention to examples and to scientific practice already. Insofar as that is the case, seeing Hempel and the CL model purely in the light or in the shadow? Subsequently, they became colleagues at Princeton. The answer is not clear, it seems to me, since the CL schema hovers somewhere in-between these two sides. Usually not much is made of that fact; but might it not deserve separate attention? In my discussion so far, I contrasted two general perspectives on the Hempel-Oppenheim account: The CL model is very vulnerable to counterexamples if we adopt the first perspective, while these examples may be discounted to a considerable degree if we take up the second perspective.

Chapter 7 : Vienna Circle - Wikipedia

On the Origins and Development of the Vienna Circle 65 On the Austrian Roots of Logical Empiricism: The Case of the First Vienna Circle 67 Thomas Uebel On the International Encyclopedia, the Neurath-Carnap Disputes, and the Second World War 94 George Reisch Carl Gustav Hempel: Pragmatic Empiricist log Gereon Wolters III.

Ernst Haeckel Ludwig Boltzmann As I said in the beginning, the creation of modern German philosophy of science is a concept with fuzzy extension. But there are names that certainly belong here. They are not names, however, of philosophers but rather of scientists. The time frame is the last third of the 19th century. I am not sure whether I am completely biased when I even dare to give a sort of date: I would like to regard this short essay as the beginning of modern German philosophy of science. I am not going to give a definition here but prefer to just list a few characteristics. Modern philosophy of science deals with the language of science, or of the sciences in general, and the meaning of scientific concepts, hypotheses, laws and theories in particular. It also deals with the meaning of fundamental concepts of the sciences, like space, time and mass in physics or gene, species, adaptation and selection in biology. Philosophy of science also attempts to clarify central methodological concepts like explanation, confirmation, and probability, and investigates their use in the sciences. And, finally, philosophy of science wants to explain the dynamics of science, i. Each of the 19th century scientists just mentioned contributed more or less to one or more of these areas. But two of them clearly stand out with respect to their achievements and their influence on subsequent developments: Ernst Mach and Gottlob Frege. In a sense these two men represent the two components of the later logical empiricism: Ernst Mach Let me first turn to Mach. Mach started out as a physiologist, and turned afterwards to experimental physics. From the beginning of his career Mach had taken great interest in philosophical questions. He did this in two directions. First, he developed a phenomenalist epistemology, i. The impact of his work can hardly be underestimated - in physics as well as in philosophy. This was the first chair for philosophy of science in the German-speaking world. Frege - who did not advance beyond the rank of unsalaried professor at the University of Jena - but invented, among other things, predicate logic. Predicate logic is the sort of logic that deals with the validity of arguments that consist of sentences that contain so called existential and universal quantifiers. Although this does not sound very exciting, the invention of predicate logic meant a secular achievement, because predicate logic replaced Aristotelian syllogistics which up to that point had represented the only form of logical reasoning, if one for the moment does not take into account 1 algebraic versions of logical inference that had been established earlier in the 19th century by George Boole and others, and 2 the propositional logic that had flourished in the Middle Ages, but had been completely forgotten in the meantime. You might find it strange that I have claimed that modern German philosophy of science originated with scientists, and might ask: Yes, there were quite a few philosophers, and some of them even cared about philosophical issues in science. But it seems to me that they did not really aim at understanding science as an enterprise in its own right, but rather worked at incorporating what they took to be science into their general philosophical systems. This holds also for Neo-Kantianism, particularly in the science-oriented so-called Marburg School. The fine beginnings of German philosophy of science came to an abrupt end, when in the Great War began, the first major disaster of the 20th century. Vienna and Berlin - The Rise of Logical Empiricism For German philosophy of science Day Two brought the most radiant sunrise of its history, and issued at that time in a day of unparalleled intellectual brilliance. It brought the rise of logical empiricism. Moritz Schlick Otto Neurath Rudolf Carnap A few words seem to be in place to briefly characterize the logico-empiricist conception of philosophy of science. Two groups of men became the leaders of logical empiricism in the Germanic lands: The third intellectual heavyweight was Rudolf Carnap who, coming from Germany, had joined the Circle first in , and then permanently in Hans Reichenbach Berlin became the other stronghold of logical empiricism, when Hans Reichenbach in received a chair as professor of philosophy of physics, very much at the initiative of Albert Einstein. The members of the Circle, perhaps with

the exception of Schlick, sought to use the Verein Ernst Mach as a vehicle not only for popularizing the thinking of the Circle, but for societal enlightenment in a more comprehensive sense, which included social reform, if not socialism, anti-clericalism, and the like. There was close cooperation between Vienna and Berlin, that culminated in with Carnap and Reichenbach taking over an existing philosophical journal, renaming it Erkenntnis, and making it to a sort of central organ of logical empiricism. In Erkenntnis had to cease publication by order of the Nazis. What were the teachings of logical empiricism? I restrict myself to only two points of which only the first is a doctrine in the strict sense of the word. The second relates to the philosophical attitude or to the style of philosophy. Logical empiricism first introduced a revolutionary and secular change in the concept of philosophy. Despite warnings, which Immanuel Kant had already issued years earlier, philosophy by and large still claimed to be able to produce factual knowledge about a variety of things. If one now has to give up that claim, as logical empiricists believed, what, if anything, remains for philosophy? To pursue philosophy can be only to clarify the concepts and sentences of science by logical analysis. They mean no less than the end of philosophy as the Western world had known it for two and a half millennia. Philosophy, in the logico-empiricist perspective, is basically reduced to philosophy of science. In ethics logical empiricists took a non-cognitivist position, which basically meant that philosophical ethics had also to restrict itself to the analysis of moral sentences that, in any case, were not propositions that could be either true or false. Philosophical writers will long continue to discuss the old pseudo-questions. But in the end they will no longer be listened to; they will come to resemble actors who continue to play for some time before noticing that the audience has stolen away. According to logical empiricism, the philosophical attitude or philosophical style is characterized by two essential ingredients: This sounds rather natural these days, but it was, and - alas! For, being a German philosopher, had mostly been a one-man business: There had been and still are - I am only slightly exaggerating - in a sense no colleagues but only disciples; philosophy had only rested on quasi-revelational insights and not on thoughts accessible to everybody. Consequently philosophical language need not necessarily have been accessible to everybody but only to the elected. Hegel and Heidegger, in large parts of their work, are only the most notorious, though not the only, examples of this tradition in German philosophy There is no evidence more illuminating on this point than when Carnap in his autobiography writes about the difficulties of getting Wittgenstein into the Circle. Although Wittgenstein lived in Vienna, in he bluntly refused to come to the Circle in order to discuss his Tractatus, in which the Circle was enormously interested. Schlick, after several talks with Wittgenstein, finally succeeded in getting him to accept Waismann and Carnap as mediators with the Circle. Being a go-between for Wittgenstein was not an easy task. Here is what Carnap tells us: We should even be cautious in asking questions, because Wittgenstein was very sensitive and easily disturbed by a direct question. The best approach, Schlick said, would be to let Wittgenstein talk and then ask only very cautiously for the necessary elucidations. For us the discussion of doubts and objections of others seems the best way of testing a new idea in the field of philosophy just as much as in the fields of science; Wittgenstein, on the other hand, tolerated no critical examination by others, once the insight had been gained by an act of inspiration. Rather I would like to point to the strong contrast in philosophical attitude or style that is on display here. The second day of the creation of modern German philosophy of science that had been illuminated so brilliantly by the sun of reason ended in a total eclipse, i. In Austria it started a year later, in , when a clerico-authoritarian regime took over and soon banned the Verein Ernst Mach. Schlick was shot dead in by a mentally sick former student - much to the praise of Catholic reactionaries who were of the opinion that he deserved it. After the putsch, Otto Neurath preferred not to return to Austria from a trip to the Soviet Union, and instead emigrated to Holland. Carnap was happy enough to emigrate from Prague to the U. Here is a list of logico-empiricist emigrants to the U.

Chapter 8 : Guide to the Carl Gustav Hempel Papers, ASP | Digital Pitt

Hempel, Carl Gustav () () (printed version available at calendrierdelascience.coms@calendrierdelascience.com) more by Gereon Wolters Carl Gustav Hempel was a leading figure of the logico-empiricist movement, originating in the 20s of the last century in Vienna and Berlin.

Formulation of the problem[edit] Usually inferred from repeated observations: Usually not inferred from repeated observations: In inductive reasoning , one makes a series of observations and infers a new claim based on them. For instance, from a series of observations that a woman walks her dog by the market at 8am on Monday, it seems valid to infer that next Monday she will do the same, or that, in general, the woman walks her dog by the market every Monday. That next Monday the woman walks by the market merely adds to the series of observations, it does not prove she will walk by the market every Monday. First of all, it is not certain, regardless of the number of observations, that the woman always walks by the market at 8am on Monday. In fact, David Hume would even argue that we cannot claim it is "more probable", since this still requires the assumption that the past predicts the future. Second, the observations themselves do not establish the validity of inductive reasoning, except inductively. Bertrand Russell illustrated this point in The Problems of Philosophy: We know that all these rather crude expectations of uniformity are liable to be misleading. The man who has fed the chicken every day throughout its life at last wrings its neck instead, showing that more refined views as to the uniformity of nature would have been useful to the chicken. But if they review some, the induction will be insecure, since some of the particulars omitted in the induction may contravene the universal; while if they are to review all, they will be toiling at the impossible, since the particulars are infinite and indefinite. But if it is without approval, whence comes it that it is truthworthy? For no matter of dispute is to be trusted without judging. And, if it has been approved, that which approves it, in turn, either has been approved or has not been approved, and so on ad infinitum. The Carvaka , a materialist and skeptic school of Indian philosophy, used the problem of induction to point out the flaws in using inference as a way to gain valid knowledge. They held that since inference needed an invariable connection between the middle term and the predicate, and further, that since there was no way to establish this invariable connection, that the efficacy of inference as a means of valid knowledge could never be stated. Here, "reason" refers to deductive reasoning and "induction" refers to inductive reasoning. First, Hume ponders the discovery of causal relations , which form the basis for what he refers to as "matters of fact". He argues that causal relations are found not by reason, but by induction. This is because for any cause, multiple effects are conceivable, and the actual effect cannot be determined by reasoning about the cause; instead, one must observe occurrences of the causal relation to discover that it holds. For example, when one thinks of "a billiard ball moving in a straight line toward another", [14] one can conceive that the first ball bounces back with the second ball remaining at rest, the first ball stops and the second ball moves, or the first ball jumps over the second, etc. There is no reason to conclude any of these possibilities over the others. Only through previous observation can it be predicted, inductively, what will actually happen with the balls. In general, it is not necessary that causal relation in the future resemble causal relations in the past, as it is always conceivable otherwise; for Hume, this is because the negation of the claim does not lead to a contradiction. Next, Hume ponders the justification of induction. If all matters of fact are based on causal relations, and all causal relations are found by induction, then induction must be shown to be valid somehow. He uses the fact that induction assumes a valid connection between the proposition "I have found that such an object has always been attended with such an effect" and the proposition "I foresee that other objects which are in appearance similar will be attended with similar effects". This claim is supported by the same reasoning as that for causal relations above, and by the observation that even rationally inexperienced people can infer, for example, that touching fire causes pain. Hume challenges other philosophers to come up with a deductive reason for the connection. If a deductive justification for induction cannot be provided, then it appears that induction is based on an inductive assumption about the

connection, which would be begging the question. Induction, itself, cannot validly explain the connection. In this way, the problem of induction is not only concerned with the uncertainty of conclusions derived by induction, but doubts the very principle through which those uncertain conclusions are derived. Goodman proposed the new predicate " grue ". Something is grue if and only if it has been or will be, according to a scientific, general hypothesis [17] [18] observed to be green before a certain time t, or blue if observed after that time. The "new" problem of induction is, since all emeralds we have ever seen are both green and grue, why do we suppose that after time t we will find green but not grue emeralds? The problem here raised is that two different inductions will be true and false under the same conditions. Goodman, however, points out that the predicate "grue" only appears more complex than the predicate "green" because we have defined grue in terms of blue and green. If we had always been brought up to think in terms of "grue" and "bleen" where bleen is blue before time t, or green thereafter , we would intuitively consider "green" to be a crazy and complicated predicate. Goodman believed that which scientific hypotheses we favour depend on which predicates are "entrenched" in our language. Quine offers a practical solution to this problem [19] by making the metaphysical claim that only predicates that identify a " natural kind " i. Bhaskar also offers a practical solution to the problem. He argues that the problem of induction only arises if we deny the possibility of a reason for the predicate, located in the enduring nature of something. If we were to change that structure, they would not be green. For instance, emeralds are a kind of green beryl , made green by trace amounts of chromium and sometimes vanadium. Without these trace elements, the gems would be colourless.

Chapter 9 : Logical positivism | Psychology Wiki | FANDOM powered by Wikia

A major challenge to any effort at determining Carl Hempel's place on the map of the history of philosophy of science is that Hempel himself was a reluctant and unreliable historian of philosophy, his own philosophy in particular.

In the spirit of logical empiricism Hempel aimed at a scientific philosophy with the principal objective to arrive at a purely logical methodology of the empirical sciences, including the social sciences. His most important contribution in this respect is what can be regarded the first theory of scientific explanation. In his later years H. Both the internal failure of this program and the influence of Thomas S. After graduation in Hempel preferred to leave Nazi Germany and went to Brussels to assist Paul Oppenheim, a private scholar, in carrying out philosophical research that related principally to concept formation in empirical science. The academic year to saw him at Queens College, New York, from where he went as associate professor to Yale in After retirement at Princeton he worked as university professor at Pittsburgh University from until He died at Princeton on 9 November, Or, in other 5 words, the explanandum must contain all pertinent statistical laws and those special facts that can be connected with the E-event by statistical laws. I-S- explanations thus relate to the body of scientific knowledge at a given time, i. In case one deduces as explanandum a general or a statistical law of lesser generality than the one s in the explanandum one obtains the reduction of a law or theory in the first case e. Originally Hempel claimed the structural identity of explanation and prediction. Later he had to admit that, although every adequate explanation is under pragmatically changed circumstances also a prediction, not every adequate prediction yields also an adequate explanation, for symptoms are often adequate for a prediction, but not for the corresponding explanation. So is, for example, a sudden fall of the barometer together with suitable laws sufficient for predicting a thunderstorm, but it does not explain it, since the fall of the barometer is not the cause of the thunderstorm, but rather a symptom of its arrival. With respect to scientific explanation this amounts to a universality thesis of scientific explanation: Explanations in these fields likewise aim at showing that the event in question was to be expected on the basis of antecedent and boundary conditions and general laws. In history those general laws are usually taken from psychology, sociology, economics, the natural sciences etc. Hempel leaves the question open whether genuine historical laws exist. Normally explanations in history and sociology fail to include an explicit statement of the laws they presuppose. This failure is due to the fact that those laws are part of folk psychology and seem to be tacitly taken for granted. Apart from that it is difficult to formulate in a sufficiently exact way the underlying general assumptions about e. Furthermore, most of the regularities in the social sciences are statistical. Therefore one can expect only explanation sketches in these fields. The method of empathic understanding that is often claimed to distinguish the social from the natural sciences is neither sufficient, nor necessary for explanations in these fields. It is not sufficient, because the individual act of understanding is only a heuristic device in order to suggest general psychological hypotheses that might subsequently serve as explanatory principles in the case under consideration. It is not necessary, because a historian might well be able to explain the deeds of a paranoiac historic personality by reference to the principles of abnormal psychology without being able to arrive at an emphatic understanding of such a personality. Hempel distinguishes a classificatory: Classification divides a given set or class of objects e. Each of these subclasses is defined by means of a certain concept e. The elements of these subclasses are those individuals to whom the respective concept applies e. The characteristics that form the defining concept are ascertainable fairly directly by observation. Classificatory concepts as well as scientific concepts in general have to fulfill two requirements. Objectivity is attained first by using operational criteria and often only partial operational definitions in a large sense that includes observation as operational and second by eliminating criteria with valuation overtones. Scientific concepts have systematic import if they lend themselves to the formulation of general laws or theoretical principles. Whereas classificatory concepts are a yes-or-no affair, i. They lead to quasi linear orderings as soon as one includes the relation of coincidence 8 e. The next step would consist in giving these linear orderings a

metric and thus arriving at quantitative concepts e. Ideal types are interpretative or explanatory schemas that contain a set of empirical generalizations that establish subjectively meaningful connections between different aspects of some kind of phenomenon, e. Accordingly ideal types must rather be reconstructed not as concepts but as theoretical systems that are intended to provide explanations and therefore must contain testable hypotheses. Despite their lack of clarity and precision there thus are also with respect to ideal types no essential methodological differences between psychology or the social sciences and the corresponding methods in the natural sciences. His reconstruction of concept formation in empirical science has become a sort of standard for objective procedures of concept formation. His later work reflects the openness of logical empiricism to new developments in the philosophy of science 9 particularly T. The philosophy of Carl G. Oxford University Press Hempel, C. Der Typusbegriff im Lichte der Neuen Logik. Wissenschaftstheoretische Untersuchungen zur Konstitutionsforschung und Psychologie. Fundamentals of concept formation in empirical science. Aspects of scientific explanation and other essays in the philosophy of science. The Free Press Hempel C. Philosophy of natural Science. University of Ottawa Press Hempel C. Cambridge University Press Houts A. Behaviour Research and Therapy 38, Salmon W. Four decades of scientific explanation. University of Minnesota Press Salmon W. Oxford University Press 10 Wolters G. University of Pittsburgh Press Keywords analytical philosophy concept formation classificatory concepts comparative concepts quantitative concepts covering-law model explication Hempel-Oppenheim Model Ideal types logical empiricism methodology prediction, structural identity with explanation rational reconstruction scientific explanation deductive-nomological D-N explanation inductive-statistical I-S explanantion unity of science Vienna Circle Abstract Carl Gustav Hempel was a leading figure of the logico-empiricist movement, originating in the 20s of the last century in Vienna and Berlin. Hempel, furthermore, connected his methodological ideas with the thesis of the unity of science, according to which there holds the same methodology both in the natural and in the social sciences. In his later work Hempel opened up to T. Cross References Empiricism, history of Explanation: Conceptions in the Social Sciences Ideal Type: