Logical positivism / logical empiricism

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1 Preliminaries

1.1 Logical positivism/empiricism

A philosophical movement whose heyday spanned the 1920s through to the 1960s.

A note about its name:

- 'Logical positivism' was the name of the movement early on (1920s & 1930s); later on the term 'logical empiricism' was more popular, and is often associated with a weakening of the initial doctrines that went under 'logical positivism'.
- 'Positivism' (or rather 'positivisme') is a term first coined by Auguste Comte (1798–1857), French philosopher and (the first?) sociologist. 'Positivisme' is derived from 'positif', whose philosophical meaning approximates 'the given', i.e. phenomenological experience.

It is a philosophical movement rather than a firm doctrine: there were many internal disagreements amongst its practitioners, and many of its central doctrines were modified—and sometimes even rejected—over time.

1.2 The Vienna Circle

Logical positivism was developed and championed by the Vienna Circle (known then as the Ersnt Mach Society): a group of philosophers, sociologists, physicists and mathematicians, initially chaired by Moritz Schlick (1882–1936), and active between 1922–1936.

Pre-history: Hans Hahn (1879–1934), Otto Neurath (1882–1945) and Philipp Frank's (1884–1966) Viennese coffee shop meetings, 1908–?1912; succeeded by the Kraft Circle (1949–?1952), one member of whom was Paul Feyerabend (1924–1994). *Also important:* the Berlin Society for Empirical Philosophy (the "Berlin circle"), led by Hans Reichenbach (1891–1953).

1.3 Historical and intellectual context

The aftermath of the First World War: economic crisis, rising nationalist movements.

A philosophical tradition centred, on the one hand, in the *German Idealism* of Fichte, Schelling and Hegel (and Heidegger), and on the other hand in neo-Kantian philosophies of Helmholtz, Hertz and Mach.

European modernist movements in literature, art and architecture—particularly the *Bauhaus* in Weimar (1919–1933), founded by Walter Gropius. (See Peter Galison's (1990), 'Aufbau/Bauhaus' for an interesting discussion of parallels.)

Recent revolutionary developments in the sciences:

- relativity and quantum mechanics ("the New Physics");
- the end of vitalism/entelechies in biology;
- developments in statistical methods in the social sciences.

The success of modern logic ("Logistic") and type theory, associated predominantly with Gottlob Frege, Bertrand Russell and Alfred North Whitehead.

1.4 Inspirations

The philosophies of science (esp. physics) of Ernst Mach (1838–1916) and Pierre Duhem (1861-1916). "The goal which [physics] has set itself is the simplest and most economical abstract expression of facts." (Mach)

The conventionalism developed by Henri Poincaré (1854–1912), which promised to displace the Kantian notion of the synthetic *a priori* (at least in the case of geometry).

Einstein's (1879–1955) early approach to physics—in particular his (brief!) conceptual treatment of simultaneity in 1905, in his development of the special theory of relativity.

The logicist philosophy of mathematics, developed by Gottlob Frege (1848–1925), Bertrand Russell (1872–1970) and Ludwig Wittgenstein (1889–1951), and spurred on by the achievements chiefly of Frege in his *Grundgesetze der Arithmetik* (1893/1903) and Russell & Whitehead in their *Principia Mathematica* (1910/1912/1913).

Wittgenstein's *Tractatus Logico-Philosophicus* (1921), credited (by the logical positivists) for: (i) a form of the verification theory of meaning; and (ii) the tautological conception of logical truth. (The attribution of (i) is highly disputable.)

2 'The Scientific Conception of the World'

In 1929, Hans Hahn, Otto Neurath and Rudolf Carnap wrote a manifesto for the logical positivism movement, which outlines the key aspects of their approach. It is available online at: http://evidencebasedcryonics.org/pdfs/viennacircle.pdf

The unity of science and positivism:

> 'The scientific world conception is characterised not so much by theses of its own, but rather by its basic attitude, its points of view and direction of research. The goal ahead is unified science. The endeavour is to link and harmonise the achievements of individual investigators in their various fields of science. From this aim follows the emphasis on collective efforts, and also the emphasis on what can be grasped intersubjectively; from this springs the search for a neutral system of formulae, for a symbolism freed from the slag of historical languages; and also the search for a total system of concepts. Neatness and clarity are striven for, and dark distances and unfathomable depths rejected. In science there are no 'depths'; there is surface everywhere: all experience forms a complex network, which cannot always be surveyed and, can often be grasped only in parts.' (SCW)

The dissolution of philosophical "pseudo-problems" through logical analysis, and the view that philosophy does not make claims, but is rather this method of analysis:

> 'Everything is accessible to man; and man is the measure of all things. ... The scientific world-conception knows *no unsolvable riddle.* Clarification of the traditional philosophical problems leads us partly to unmask them as pseudo-problems, and partly to transform them into empirical problems and thereby subject them to the judgment of experimental science. The task of philosophical work lies in this clarification of problems and assertions, not in the propounding of special 'philosophical' pronouncements. The method of this clarification is that of logical analysis; of it, Russell says (*Our Knowledge of the External*

World, p. 4) that it "has gradually crept into philosophy through the critical scrutiny of mathematics ... It represents, I believe, the same kind of advance as was introduced into physics by Galileo: the substitution of piecemeal, detailed and verifiable results for large untested generalities recommended only by a certain appeal to imagination." ' (SCW)

'But what is [Philosophy] then? Well, certainly not a science, but nevertheless something so significant and important that it may henceforth, as before, be honored as the Queen of the Sciences. For it is nowhere written that the Queen of the Sciences must itself be a science. The great contemporary turning point is characterized by the fact that *we see in philosophy not a system of cognitions, but a system of acts*; philosophy is that activity through which the meaning of statements is revealed or determined. By means of philosophy statements are explained, by means of science they are verified. The latter is concerned with the truth of statements, the former with what they actually mean. The content, soul and spirit of science is lodged naturally in what in the last analysis its statements actually mean; the philosophical activity of giving meaning is therefore the Alpha and Omega of all scientific knowledge.' (Schlick, 'The Turning Point in Philosophy', 1930)

Phenomenological experience as the source of all knowledge:

'The aim of scientific effort is to reach the goal, unified science, by applying logical analysis to the empirical material. Since the meaning of every statement of science must be statable by reduction to a statement about the given, likewise the meaning of any concept, whatever branch of science it may belong to, must be statable by step-wise reduction to other concepts, down to the concepts of the lowest level which refer directly to the given.' (SCW)

Objectivity through the (intersubjective) structure of appearances:

'A scientific description can contain only the structure (form of order) of objects: not their "essence". What unites men in language are structural formulae; in them the content of the common knowledge of men presents itself. Subjectively experienced qualities – redness, pleasure – are as such only experiences, not knowledge; physical optics admits only what is in principle understandable by a blind man too.' (SCW)

The perceived enemy:

'[N]othingness is the source of negation, not *vice versa*. If the power of the understanding in the field of questions concerning nothingness and being is thus broken, then the fate of the dominion of "logic" within philosophy is also decided therewith. The idea of "logic" itself dissolves in the turbulence of a more original questioning.

'The supposed soberness and superiority of science becomes ridiculous if it does not take nothingness seriously. Only because nothingness is manifest can science make what is itself into an object of investigation. Only if science takes its existence from metaphysics can it always reclaim anew its essential task, which does not consist in the accumulation and ordering of objects of acquaintance but in the ever to be newly accomplished disclosure of the entire expanse of truth of nature and history.

'Therefore no rigor of a science can attain the seriousness of metaphysics. Philosophy can never be measured by the standard of the idea of science.' (Heidegger, *Being and Time*, 1929)

The "struggle against metaphysics":

> 'These indications [are presented] only so that one will not think that the struggle against metaphysics is our primary task. On the contrary: in the meaningful realm [there are] many tasks and difficulties, there will always be enough struggle. The struggle against metaphysics is only necessary because of the historical situation, in order to reject hindrances. There will, I hope, come a time when one no longer needs to present lectures against metaphysics.' Carnap, in a lecture given in July and December 1932 (trans. by Friedman 2000)

3 Key doctrines

3.1 The verification principle

'The meaning of a statement is its method of verification.' (Schlick) Perhaps more sensibly: 'To know the means of verification of a statement is to know its meaning.' (Godfrey-Smith)

We know what the fate of metaphysical statements is supposed to be. *But what about...*

- *ethical statements?* Typically, emotivism or prescriptivism, or some other non-cognitivism.
- *logical statements?* Tautologies, and so strictly speaking meaningless (*sinnlos*, as opposed to *unsinnig*, in the terminology of the early Wittgenstein).
- *mathematical statements?* Reduced to logical statements, with an appropriately conventionalist attitude toward logic (at least for Carnap).
- *general scientific statements, such as laws?* They are connected to verifiable statements via relations of *inductive confirmation* (more below).
- *scientific statements about unobservables?* Roughly speaking, they are connected—by relations of deductive entailment—to verifiable statements, via definitions ("bridge principles"). This invokes both an *analytic/synthetic distinction* and an *observational/theoretical dichotomy* (more below).

The initial focus on phenomenological experience as the epistemic and semantic foundation was later relaxed to include intersubjective claims about J. L. Austin called "middle sized dry goods", such as tables and measuring instruments. (See Carnap 1932.)

3.2 A logical theory of confirmation

E.g. Boyle's Law: 'At constant temperature, the pressure and volume of an ideal gas are inversely related.' This has the general form: 'For *any* ideal gas, if _____, then ....'

Ignore for now the facts that: (i) '_____' and '...' are likely not expressed in terms that makes their truth verifiable; and (ii) "ideal" gases are not exactly realised in nature. Even if (i) and (ii) could be solved, still we would need some way of relating the universal generalisation to individual instances, each of which is verifiable.

So we need a *theory of confirmation*. Carnap dedicated much of his later life to this project. A crucial constraint on his project is that the relationship between a hypothesis and its evidence must be an "internal" one—i.e., it must be *logical*. For any "external" relationship would be synthetic—i.e., meaningful—and as such would need to be subject to (at least) confirmation, as required by the verification principle. But what sort of evidence would we accept for *that* sort of relationship, and how could we understand its confirmation?

3.3 The analytic/synthetic distinction

Inherited from Kant (but primordial in Locke, Leibniz and Hume).

- A statement is *analytic* := it is true "in virtue of its meaning" := its meaning suffices for its truth.
- A statement is *synthetic* := it is not analytic.

All logical truths are analytic—significantly, the truths of the "Logistic" of Russell and Whitehead. Definitions and stipulations are also analytic. This vastly inflates the collection of what Kant took to be the analytic truths.

Straightforward empirical statements ("directly verifiable" statements) are synthetic. More "theoretical" statements are a more subtle matter: of course, they are synthetic (if they are meaningful), but Carnap talked of the "analytic"—as opposed to the "factual", or "synthetic"—component of a theoretical statement, even of a theory itself.

This conception became more sophisticated as Carnap relaxed the requirement that the "bridge principles" (linking observational and theoretical terms) be explicit definitions. (Carnap programmatically outlined such explicit definitions in *Der Logische Aufbau der Welt*, 'The Logical Structure of the World', in 1928.) By 1936 Carnap had discovered the notion of *partial interpretation*, or *partial definition*, which was crucial to his mature view (by 1963) of a scientific theory as a partially interpreted axiomatic system. According to this view, the observational consequences of a given theory, together with the internal deductive relationships between its axioms, implicitly—and typically only incompletely—define its theoretical terms.

3.4 Observational/Theoretical distinction

For Carnap, this was a distinction between terms of our language. The initial idea was that theoretical terms are derivative—i.e. definable in terms of, or translatable to, the observational terms (see Carnap 1932). We have seen how this became more nuanced over time. In particular, Carnap gave up on the *eliminability* of theoretical terms (thereby answering Hempel's 'Theoretician's Dilemma').

For example: in Newton's laws of motion, 'acceleration' is likely an observational term; 'force' and 'mass' are theoretical.

The upshot is that the goal of science is *not* to discover hidden truths ('In science there are no "depths"...'), but to generate reliable predictions, or a concise and accurate summary of the observable facts ("empirical adequacy").

3.5 No synthetic *a priori*

Kant's taxonomy of judgments:

	analytic	*synthetic*
a priori	some logic, e.g. 'not-(P & not-P)' conceptual containment	arithmetic, e.g. '$7 + 5 = 12$' geometry causality
a posteriori		empirical judgments, e.g. 'There is a red book on the table.'

The logical positivists expanded the analytic truths to include the new "Logistic" (i.e. type theory) of Russell and Whitehead. This was sophisticated enough to bring pure mathematics (e.g. arithmetic and analysis) into the realm of "logical truths" and definitions.

Some remaining, apparently synthetic *a priori*, truths were reconstrued as *conventions*—therefore definitions—along the lines laid out by Poincaré. ?E.g.: 'Every effect is preceded by its cause.'

The remaining apparently synthetic *a priori* truths were reconstrued as *a posteriori*. ?E.g.: 'Physical space is Euclidean.'

The *illusion* of the synthetic *a priori* was to be explained by: (i) ambiguity (e.g. between pure and applied mathematics); (ii) the need for an unsettled convention; or (iii) a high degree of logical complexity. (Key examples were the truths of geometry, and simultaneity—both inspired by Einstein.)

4 Challenges to the key doctrines

4.1 Verification principle

- Is the principle self-defeating?
  - Is it factual (synthetic)? What would verify it?
  - Is it analytic? It doesn't *seem* analytic...
  - Is it a statement at all, or a "pseudo-proposition"?
- Are the verifiable statements closed under logical operations? If P is verifiable, does this make $P \vee Q$ automatically so, no matter what Q is? A. J. Ayer's "Patch and puncture" history.
- The rise of "externalist" theories of meaning (Kripke, Putnam).

4.2 Observational/Theoretical distinction

The distinction seems to require the existence of an observational vocabulary *independent* of any particular theory. *But:*

- Observational terms presumably refer to observable entities. But 'observable' is a vague predicate. Is an object observable through a telescope? Or a prism? What about a window? (Maxwell.)
- What is observable seems to depend on the state of technological (and so scientific) progress. (Maxwell.)
- No term seems to be completely extricated from theoretical baggage, in the sense that: (i) observation reports are embedded in a rich network of implications and assumptions, many of which are theoretical in nature, and many of which are defeasible (Hanson); or (ii) *all* of our concepts are embedded in a "conceptual scheme" (Kuhn, Feyerabend)
- What are observed are *facts*, not *things*, so why make the distinction between terms and not sentences? (Quine)

4.3 Confirmation theory — See next week's lecture...

4.4 Analytic/Synthetic distinction

In his paper 'Two Dogmas of Empiricism' (1951), W.V.O. Quine levelled an attack on this distinction. Quine claimed that it is impossible to explain the term 'analytic' to someone who does not already

claim to understand terms like 'meaning', 'synonymy' and 'necessity'. These terms comprise a tight circle of definability, which seems impossible to enter.

Quine's "vegetarian substitute" for analyticity was *stimulus analyticity*: a sentence is stimulus analytic iff it is assented to in all situations. But this fails to distinguish analytic sentences proper (such as 'All bachelors are unmarried') from widely and confidently held empirical truths (such as 'There have been black dogs').

(N.B.: Quine continued to believe in (a form of) verificationism and (a form of) the O/T distinction.)

4.5 No synthetic *a priori* propositions

The collapse of the analytic/synthetic distinction would entail a collapse of the fact/convention distinction: what would it mean anymore to deny the synthetic *a priori*?

Furthermore, Frege's project to reduce arithmetic to logic failed. Russell & Whitehead's project succeeded in reducing arithmetic to type theory (and, with later projects, to set theory), but are these frameworks "logic" worthy of the name—especially given the importance for the logical positivists/empiricists that, following Wittgenstein, all logical truths be tautologies? More specifically, Carnap's conventionalism about logic—which at least demanded that one's stipulated logical framework be *consistent*—is thought by some to come under pressure from Gödel's incompleteness theorems of 1931.

5 Suggested reading

- Carnap, R. 'On Protocol Sentences', translated from 'Über Protokollsätze', *Erkenntnis* **3**, pp. 215–228 (1932), by R. Creath and R. Nollan (1987), *Noûs* **21**, pp. 457–470.
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- Maxwell, G., 'The Ontological Status of Theoretical Entities', in H. Feigl and G. Maxwell (eds.), *Scientific Explanation, Space, and Time, vol. 3, Minnesota Studies in the Philosophy of Science* (University of Minneapolis Press, 1962), pp. 3-15.
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- Quine, W. V. O., *The Pursuit of Truth* (Harvard University Press, 1990), Chapter 1.