School of philosophy risen in Austria and Germany during 1920s, primarily concerned with the logical analysis of scientific knowledge. Among its members were Moritz Schlick, Rudolf Carnap, Hans Reichenbach, Herbert Feigl, Philipp Frank, Kurt Grelling, Hans Hahn, Carl Gustav Hempel, Victor Kraft, Otto Neurath, Friedrich Waismann.

Logical positivists denied the soundness of metaphysics and traditional philosophy; they asserted that many philosophical problems are indeed meaningless.

According to logical positivism, there are only two sources of knowledge: logical reasoning and empirical experience. The former is analytic a priori, while the latter is synthetic a posteriori; hence synthetic a priori does not exist. The fundamental thesis of logical positivism consists in denying the possibility of synthetic a priori knowledge; you can see an explicit disagreement with Kantian philosophy.

Einstein's theory of relativity exerted a great influence on logical positivism. At its origin, logical positivism was primary concerned with the philosophical interpretation of theory of relativity. I can remember, as an example of the great influence exerted by Einstein's theory of relativity, that Schlick wrote in 1915 and 1917 two essays on relativity, Reichenbach attended Einstein's lectures on the theory of relativity at Berlin in 1917 and wrote in 1920s four books on relativity, Carnap's first work was an essay about the theory of space published in 1922. Other works on relativity were published in 1950s by Frank.

Also quantum mechanics was a major subject of philosophical investigation. Works about quantum theory were published by Schlick and Reichenbach. The latter is also the author of studies on thermodynamics.

Another great influence on logical positivism was exerted by the development of formal logic. Carnap attended three courses on logic under the direction of G. Frege, the father of modern logic. Frege asserted that all arithmetic statements are analytic a priori, and thus he denied the existence of synthetic a priori statements in arithmetic (however Frege regarded geometry as synthetic a priori).

Logical positivism had extensive contacts with the group of Polish logicians (mainly Jan Lukasiewicz, Kazimierz Ajdukiewicz and Alfred Tarski), who developed several branches of contemporary logic, like the algebra of logic, many-valued propositional calculus and the theory of semantics in a formal language.

The influence of contemporary logic on logical positivism is also evident in the name itself: *Logical* positivism.

According to logical positivism, a scientific theory is an axiomatic system that obtains an empirical interpretation through appropriate statements called rules of correspondence, which establish a correlation between real objects (or real processes) and the abstract concepts of the theory. The language of a theory includes three kinds of terms:

1. Logical terms, which include all mathematical terms.
2. Observational terms, which denote objects or properties that can be directly observed or measured.
3. Theoretical terms, which denote objects or properties we cannot observe or measure but we can only infer from direct observations.

According to this distinction, the statements of a theory are divided in three sets:

1. Logical statements, which include only logical terms.
2. Observational statements, which include observational and logical terms.
3. Theoretical statements, which include theoretical, observational and logical terms. Theoretical statements are divided in:
    - Pure theoretical statements, which do not include observational terms.
    - Mixed theoretical statements, which include observational terms.

The following table represents the diverse kinds of statements.

<table>
<tr><td colspan="8">Statements</td></tr>
<tr><td rowspan="2">L-statements</td><td colspan="2" rowspan="2">O-statements</td><td colspan="5">T-statements</td></tr>
<tr><td colspan="3">Pure T-statements</td><td colspan="3">Mixed T-statements</td></tr>
<tr><td>L-terms</td><td>L-terms</td><td>O-terms</td><td>L-terms</td><td>T-terms</td><td>L-terms</td><td>O-terms</td><td>T-terms</td></tr>
</table>

(Abbreviations: L=Logical, O=Observational, T=Theoretical)

With respect to the method of ascertaining their truth or falsity, the statements of a scientific theory are divided in two sets:

1. Analytic a priori statements, whose truth is based on the meaning of the terms of the language. They include logical statements, whose truth is based only on the rules of logic and mathematics.
2. Synthetic a posteriori statements, which are the not-analytic statements.

Another distinction is between:

1. P-true or P-false statements, which are either a logical consequence of the axioms of the theory or incompatible with the axioms (that is, their negation is a logical consequence of the axioms).
2. Contingent statements, which are independent from the axioms of the theory.

The following table represents the diverse kinds of statements.

<table>
<tr><td colspan="3">True</td><td colspan="3">False</td></tr>
<tr><td colspan="2">P-true</td><td>Contingent</td><td colspan="3">P-false</td></tr>
<tr><td>Analytic a priori true</td><td colspan="3">Synthetic a posteriori</td><td colspan="2">Analytic a priori false</td></tr>
<tr><td>Logical true</td><td colspan="4">Possible</td><td>Logical false</td></tr>
</table>

(From: Rudolf Carnap, *Analiticità, significanza, induzione*, ed. Alberto Meotti and Marco Mondadori, il Mulino, Bologna, 1971, pag. 114)

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Date of publication
December 30, 2004

Last update
December 15, 2007