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## **Rudolf Carnap (1891-1970)**

- "The function of logical analysis is to analyse all knowledge, all assertions of science and of everyday life, in order to make clear the sense of each such assertion and the connections between them. One of the principal tasks of the logical analysis [...] is to find out the method of verification for [...] proposition[s]." -- Carnap, on his approach

## **General Definitions of Scientific Theory**

- A comprehensive explanation of some aspect of nature that is supported by a vast body of evidence (from *National Academy of Sciences*)

- A description of nature that encompasses more than one law but has not achieved the uncontroversial status of a law (from *Oxford Dictionary of Science, 6th Ed.*)
- A set of statements or principles devised to explain a group of facts or phenomena (from *American Heritage Science Dictionary*)

## **Carnap's Project Broadly Construed**

- Scientific theory is a collection of sentences expressed in a formal language
- Evaluating the sentences requires understanding the terms used
- Only then can we devise a method of verifying their truth (or whether they are scientific)
- Science uses observational terms and theoretical terms

## **Structure of Carnap's Argument**

- **The Problem:** How do we justify theoretical laws?
  - Empirical laws use observation terms that can be observed directly and measured
  - Theoretical laws use terms, e.g., atom, molecule, etc., that can't be observed or directly measured

- **The Solution:** Correspondence Rules, which translate terms for observables to terms for unobservables
  - However, we can never strictly define theoretical terms
- **The Demonstration:** Examples from the history of science such as the kinetic theory of gases
- **An Important Reminder:** Anticipatory versions of theories should not be rejected out of hand