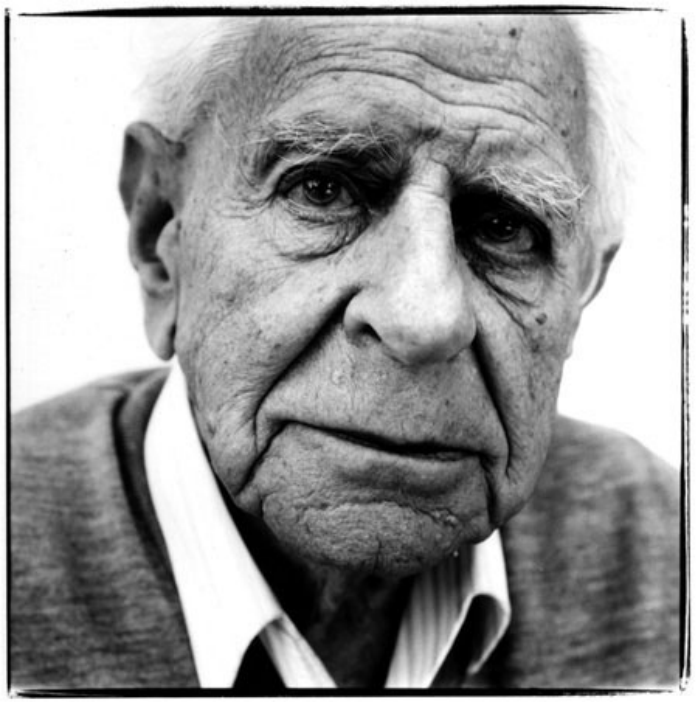
Philosophy of Science

Demarcation criteria: What differentiates between science and pseudoscience?



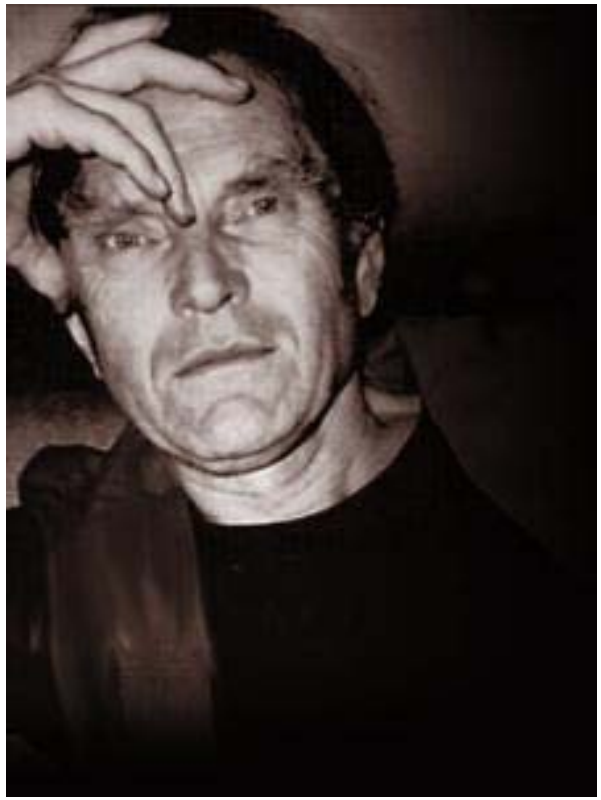
If a theory if falsifiable, then it is scientific.

Karl Popper, 1935

A given fact is explained scientifically only if a new fact is predicted with it.

Imre Lakatos, 1973

Given any rule, there are always circumstances when it is advisable not only to ignore the rule, but to adopt its opposite.



Paul Feyerabend, 1975

In propositonal logic, one valid rule of inference is **Modus Tollens** (denying the consequent).

Modus Tollens

If p then q

Not q

Therefore not p

Modus Tollens

If *theory* then *data*

Not *data*

Therefore not *theory*

Affirming the Consequent

If p then q

q

Therefore p

Affirming the Consequent

If *theory* then *data*

data

Therefore *theory*

Affirming the Consequent

If *man* then *human*

human

Therefore *man*

A theory can either be **refuted**, or **corroborated**, but never **proven**.

No number of sightings of white swans can prove the theory that all swans are white. The sighting of one black one may disprove it.

When inferences are based on statistics, falsifications are not black or white.

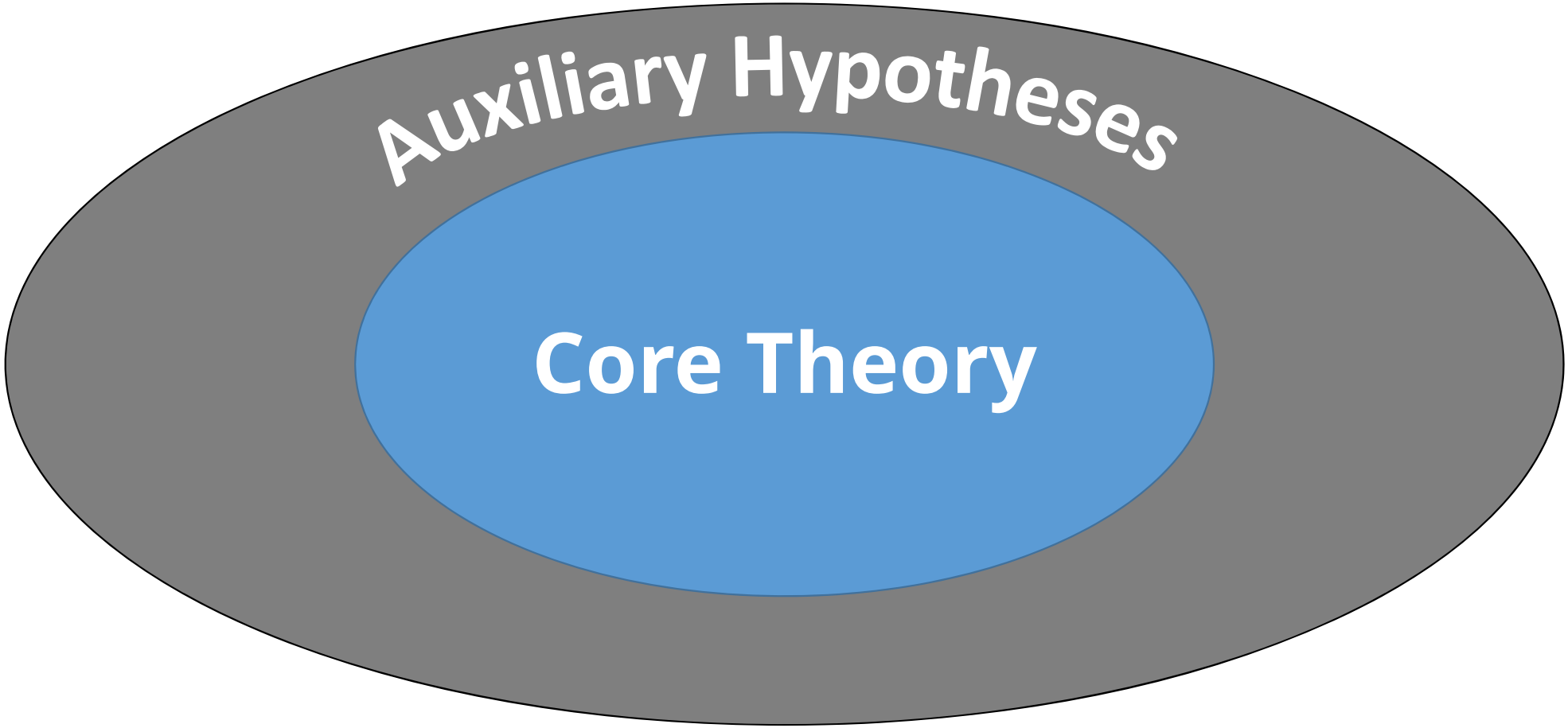
We don’t reject a theory after a single falsification.

Imre Lakatos, 1973

The lesson of history is that a bold and plausible theory that fills a scientific need is seldom broken by the impact of contrary facts and arguments. Only with an alternative theory can we hope to displace a defective one.

Stevens, 1957

What is falsified? The theory? Or auxiliary theories (assumptions, background info)?

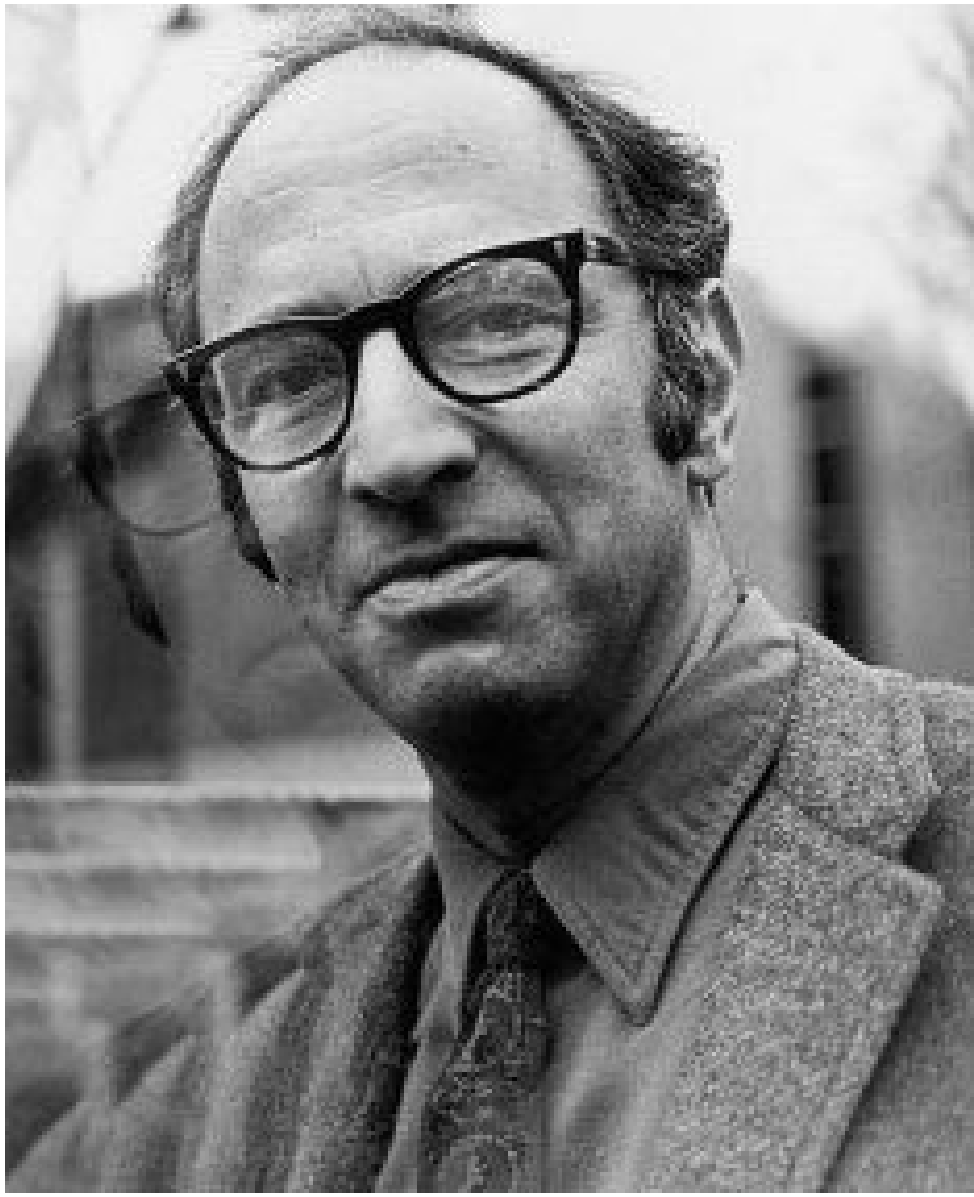

Auxiliary Hypotheses
Core Theory

Progressive Research Line

Degenerative Research Line

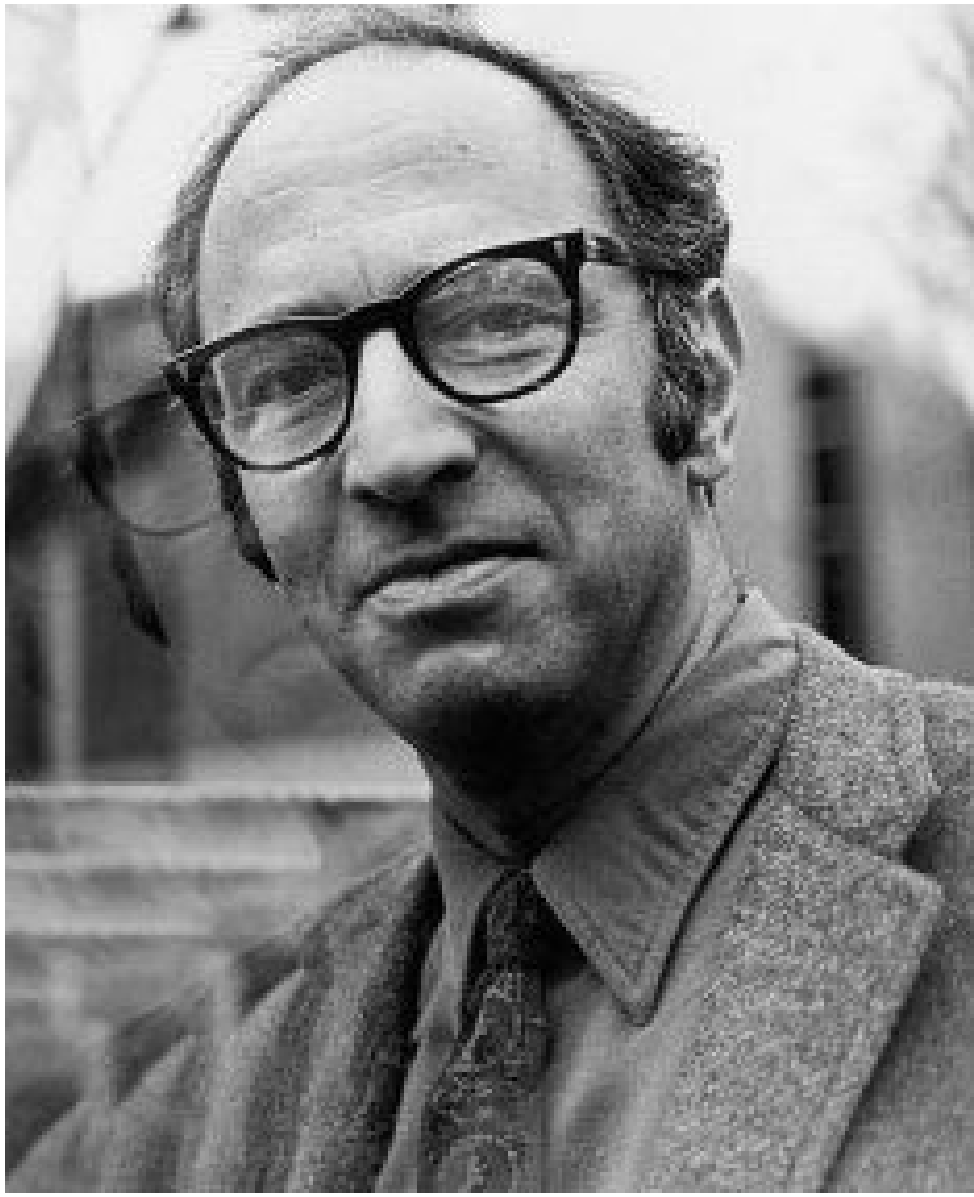
Observations are “theory-laden”, not objective.

Thomas Kuhn, 1962



The proponents of competing paradigms practice their trades in different worlds.

Thomas Kuhn, 1962



Normal ‘puzzle-solving’ science is followed by paradigm shifts.

Science is not cumulative, but revolutionary, based on subjective reasons

Scientific knowledge is a social product.

Helen Longino, 1990

Intersubjective criticism is what constitutes the objectivity of science

Public avenues for criticism, shared standards, open to reevaluation, equality

Defining what makes something science is difficult. There is no single answer.