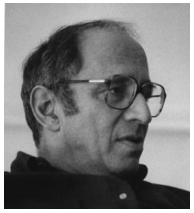
09. After Kuhn: Lakatos, Laudan, Feyerabend

1. Lakatos and Research Programs

Imre Lakatos
(1922-1974)

- *Criticism of Kuhn*: Science is rational, not "mob psychology"!
  - *Aim of Philosophy of Science*: To produce "rational reconstructions" of historical episodes to make scientists' decisions as rational as possible (with footnotes indicating what *actually* occurred).

Whig history?



Science left in the hands of implicit shared values can be trusted!

No! Science needs the guidance of methodological rules!

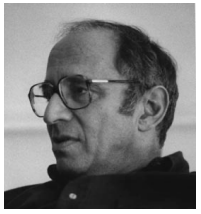
- *Instead of paradigms*:

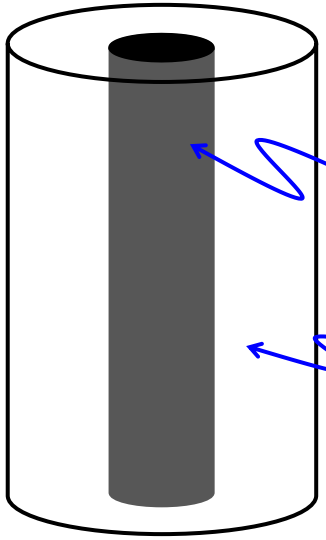
Research program:

(i) Typically *more than one* at any time in a given field.

(ii) *And*: They *compete* with one another.

Harumph! One paradigm per field, and competition only during revolutionary science!





Core = essential basic ideas

Protective belt = auxiliary hypotheses used to apply core to descriptions of phenomena

Theory = core plus protective belt

Research program = sequence of theories with same core

Ex. 1: Newtonian research program

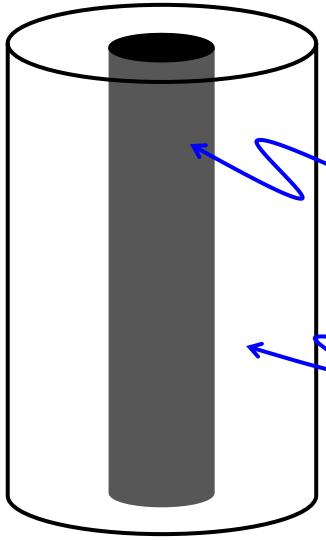
Core: Three Laws of Motion and Law of Gravity.

Preserved over time.

Protective belt:

- *Claims about nature of matter.*
- *Claims about structure of universe.*
- *Math techniques used to derive predictions from core.*

Changed over time.



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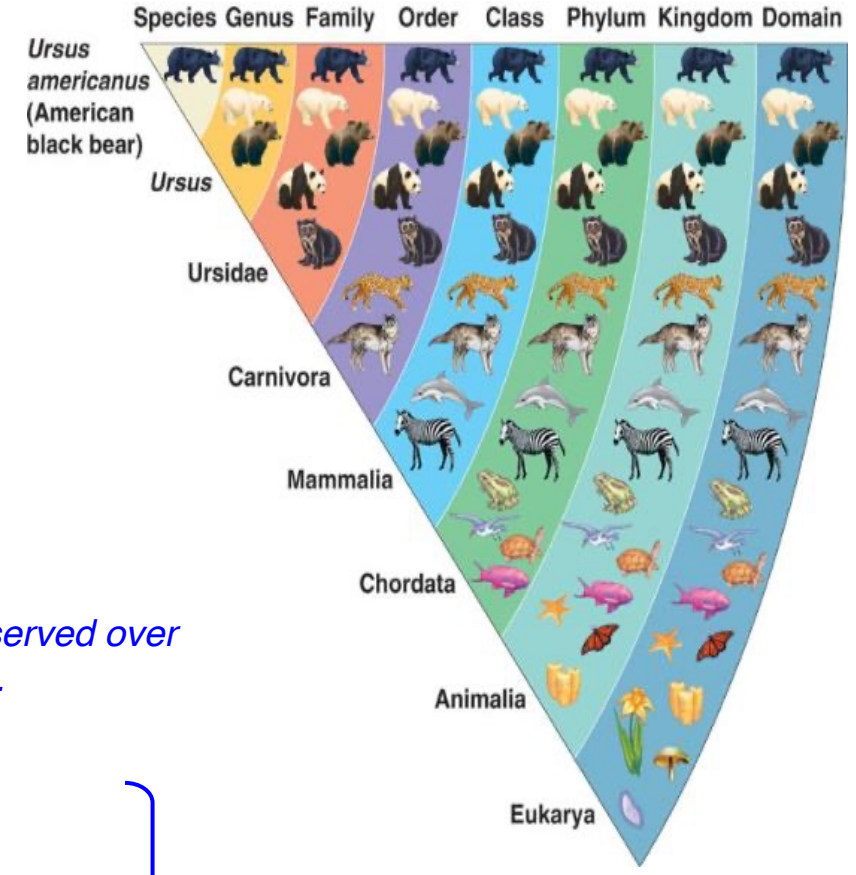


Ex. 2: Darwinian research program

Core: Organisms evolve by descent through modification *via* natural selection (and other causes).

Preserved over time.

Protective belt:

- *Claims about relations between species.*
- *Claims about mechanisms underlying inheritance.*
- *Claims about distribution of organisms.*
- *Claims about other (non-adaptive) causes of evolution.*

Changed over time.

Two types of change

(a) Within a research program.

(b) Between research programs.

(a) *Change within a research program*

Rule 1: Change should only be made to a protective belt.

Rule 2: Change to a protective belt should be *progressive*.

Progressive program:

- Increasing *novel* predictive power and application to new cases.
- Success at addressing anomalies and fending off refutations.

Degenerating program:

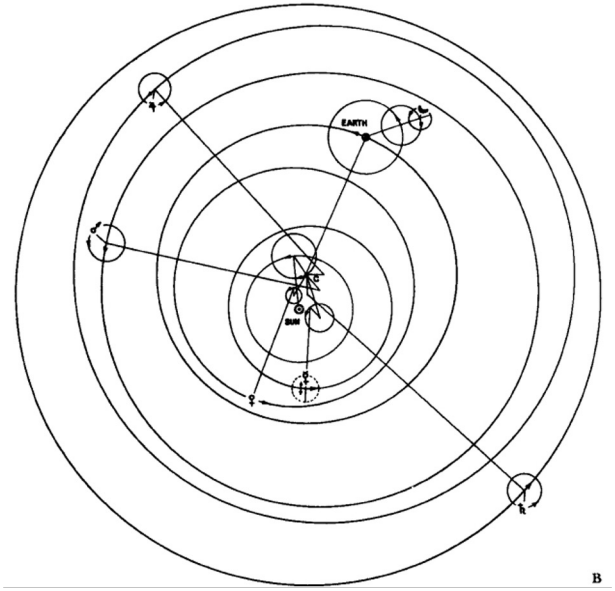
- No novel predictions, just "saving the phenomena".
- Falling behind or just keeping up with attempts to address anomalies.

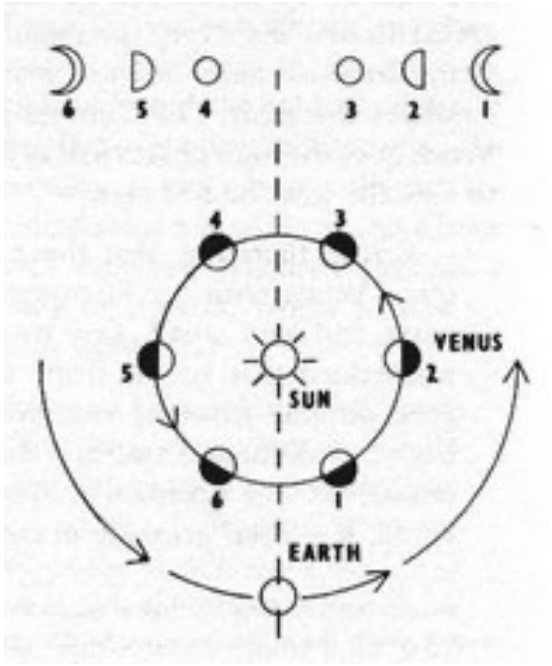
Progressive program: Copernican (heliostatic) system

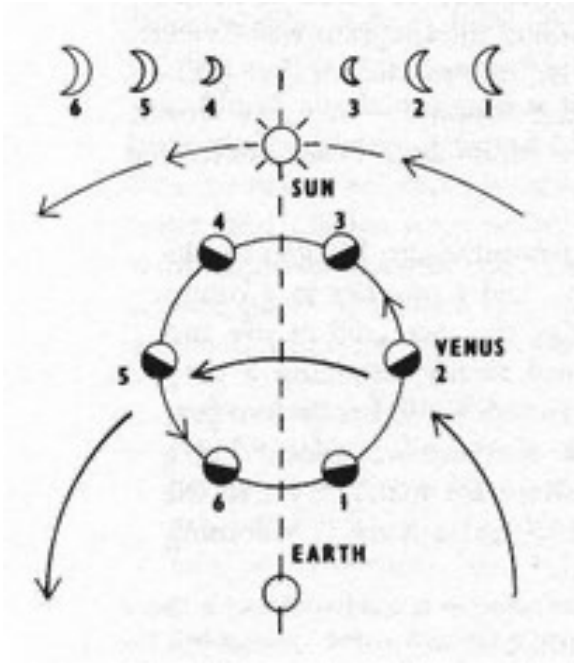
- Accounted for all known phenomena.
- *Novel prediction*: Venus displays both crescent and gibbous phases.

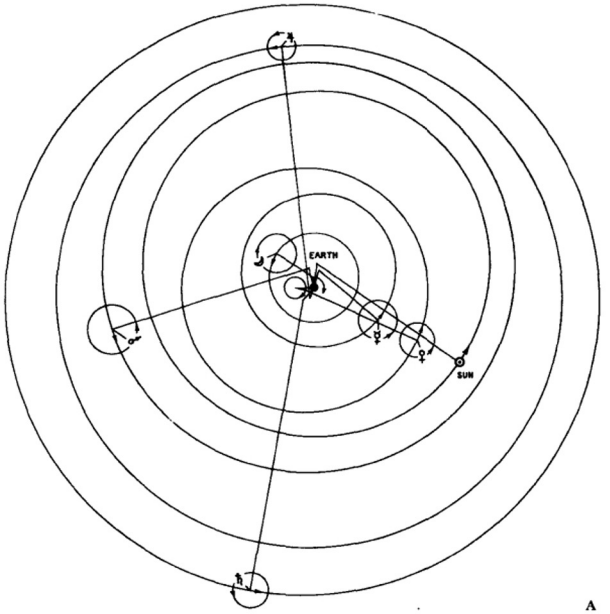
Degenerating program: Ptolemaic (geostatic) system

- Accounted for all known phenomena.
- Can only account for crescent phases of Venus, or gibbous phases, but not both!







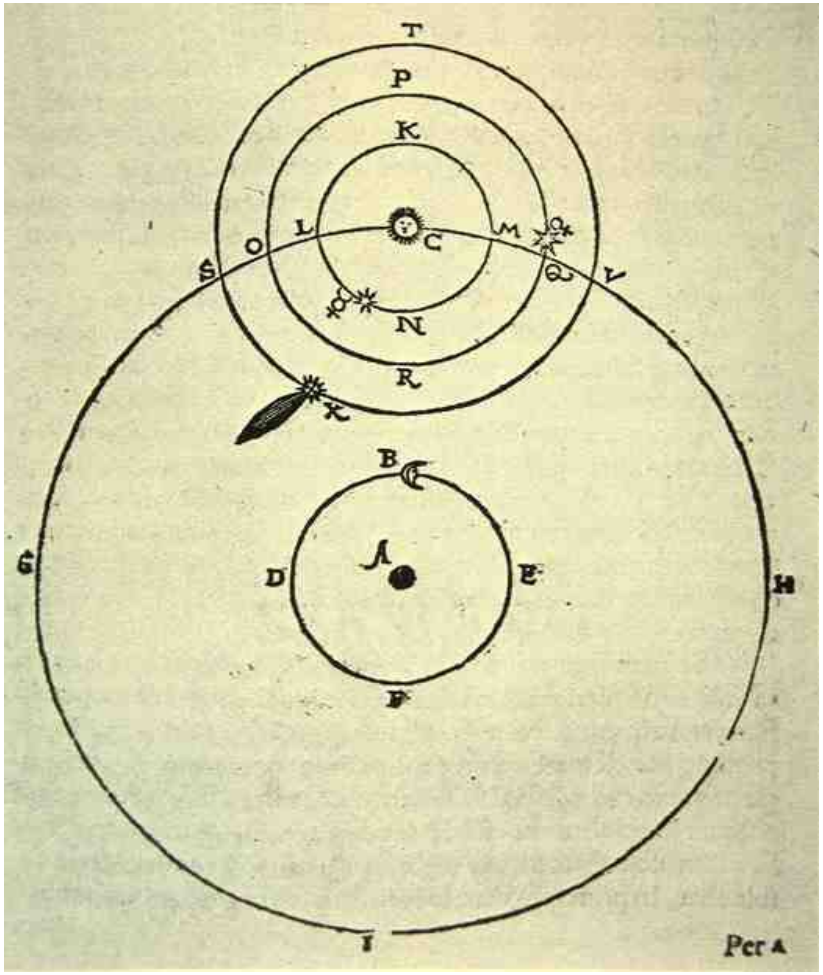


(b) *Change between research programs*

- What governs change at this level ("Rule 3")?
- When is a rational scientist justified in giving up a degenerating research program?

<silence>

Concern: Need a "Rule 3" if you're concerned that Kuhn's account isn't rational (i.e., what rule governs change across paradigm shifts).



Tychonic (geostatic) system

- Accounted for all known phenomena, including both crescent and gibbous phases of Venus!

2. Laudan and Research Traditions

(a) *Instead of research programs*:

Research tradition: more flexible...

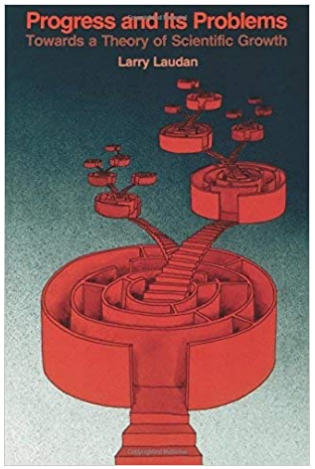
(i) There can be movement of ideas in and out of the core.

(ii) Theories are more loosely related.

(iii) Later theories can cover less ground than earlier ones.

(iv) Theories can break away from one tradition and be absorbed into another.

Larry Laudan

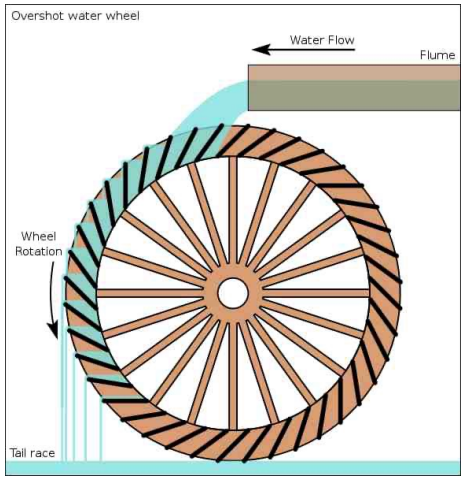


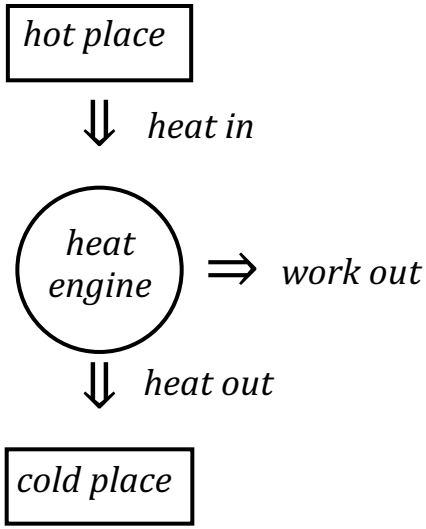
Progress and its Problems (1978)

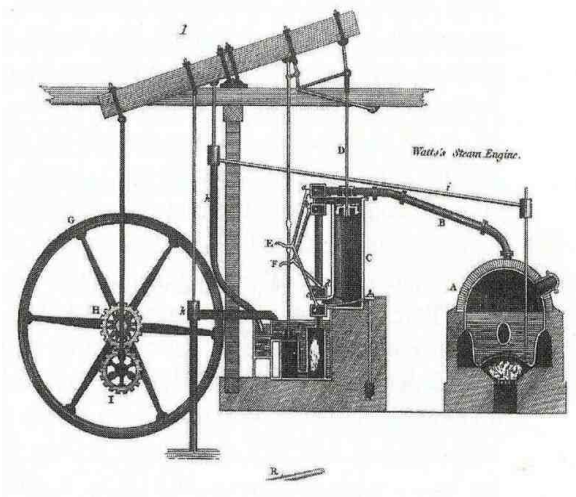
Ex. Carnot's (1824) theory of heat engines

Sadi Carnot
(1796-1832)

- *Idea*: Treat heat in analogy with water as a substance ("caloric") that produces mechanical effect (work) when it "falls" from a hot place to a cold place.







- Originally a part of the caloric research tradition.
  - *Core: heat is a fluid substance.*
- Later gets absorbed into the kinetic research tradition.
  - *Core: heat consists of the motion of particles.*

(b) *Two attitudes towards theories*:

- *Acceptance*. To *accept* a theory is to treat it as if it were true.
- *Pursuit*. To *pursue* a theory is to work with it without necessarily accepting it.

Claim: It is rational to *both*

(i) *pursue* a research tradition that has the highest current rate of progress in problem-solving; and

(ii) *accept* those theories that have the greatest problem-solving power.

- Allows a rational scientist to accept the ideas in a mainstream research tradition, but work on a more marginal tradition that has a higher rate of progress.

"Scientists tend to begin to pursue and to explore a new research tradition long before its problem-solving success qualifies it to be accepted over its older, more successful rivals."

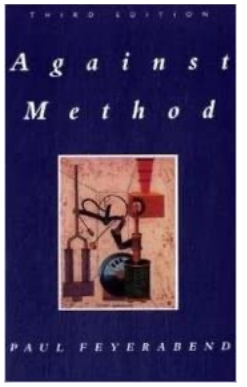
- What is the optimal distribution of scientists across a range of research traditions?
  - *All working on progressive traditions?*
  - *Some distribution across both progressive and degenerate traditions? (Hedging bets?)*

<silence>

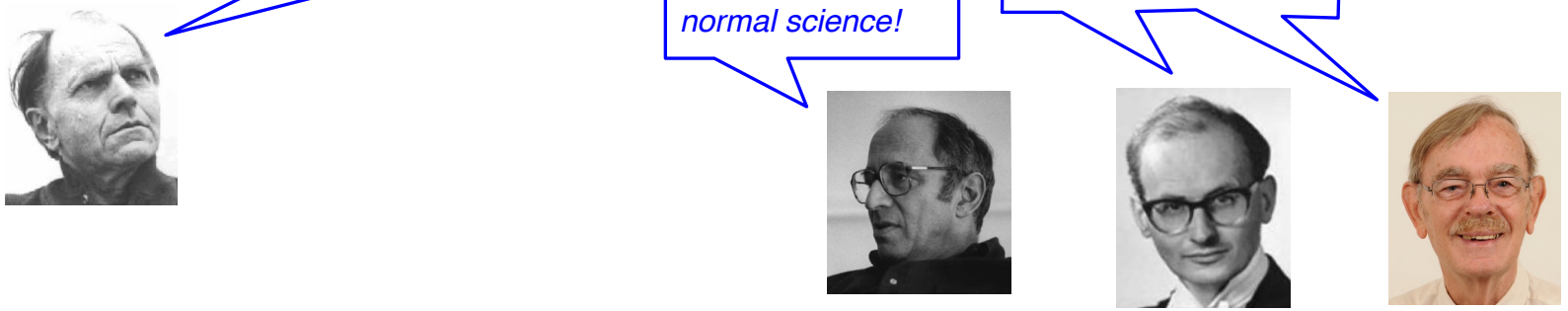
3. Feyerabend and Anything Goes

Paul Feyerabend
(1924-1994)

- *Epistemological anarchism*: Opposition to all systems of rules and constraints in science.
- *Motivation from Popper*: Science is an aspect of human creativity.
  - *Essential to all intellectual work (including science): The free development of creativity and imagination.*
  - *Any attempt to establish rules of method will result only in a straightjacketing of creativity.*
  - *The only rule is:*



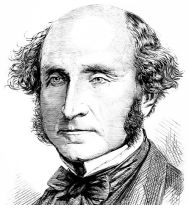
Against Method
(1975)



- *Are there rational rules for creativity?*
- *Can you be taught to be innovative?*

- *Motivation from Mill*:
  - Stresses individual liberty.
  - Geniuses are only produced in an atmosphere of freedom.

"By it there are as many possible independent centers of improvement as there are individuals."

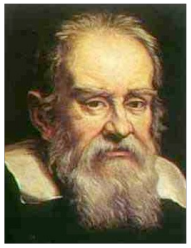


John Stuart Mill
(1806-1873)

- *Feyerabend's Morale*

"It is advisable to let one's inclinations go against reason in any circumstances, for science may profit from it."

- *Ex*: Galileo marveling at Copernicans who flount established Aristotelian worldview



Galileo Galilei
(1564-1642)

"...through sheer force of intellect [they have] done such violence to their own senses as to prefer what reason told them over that which sensible experience plainly showed them to be the contrary."

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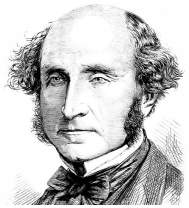

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"It is advisable to let one's inclinations go against reason in any circumstances, for science may profit from it."

- *Concern*: What about a mechanism for the *elimination* of ideas?
  - *"What do we do when the bridge has to be built?" (Godfrey-Smith)*
  - *Claim: Imagination and creativity are one side, but not the only side, of science.*