



# Philosophy of Science

Dr Jonathan Livingstone-Banks

04/03/2023

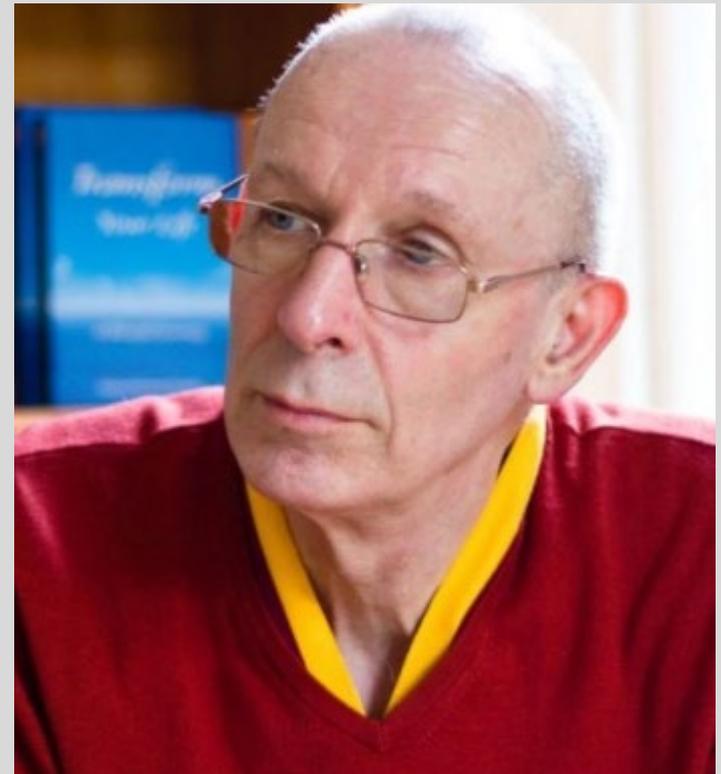
# What is the philosophy of science?

- What is philosophy?
  - Domain: to understand the world around us
  - Methods: non-empirical - if you can (in principle) use an experiment to settle the debate, then the question isn't a philosophical one
  - In this sense, as empirical methods have improved, topics once considered philosophical have become the subject of science

- Philosophy of science, then, asks philosophical questions about the discipline(s) of science (and to the things that science leads us to believe). As such it is made primarily of:
  - Metaphysics of science
  - Epistemology of science
  - Thinking about *what science is* and *how it should be done*

# Epistemology

- The investigation of knowledge
- But what is knowledge?!
- At a minimum, it must be:
  - Propositional
  - Believed
  - Factive
  - justified



# Deductive vs inductive reasoning

## MODUS TOLLENS

$$P \supset Q$$

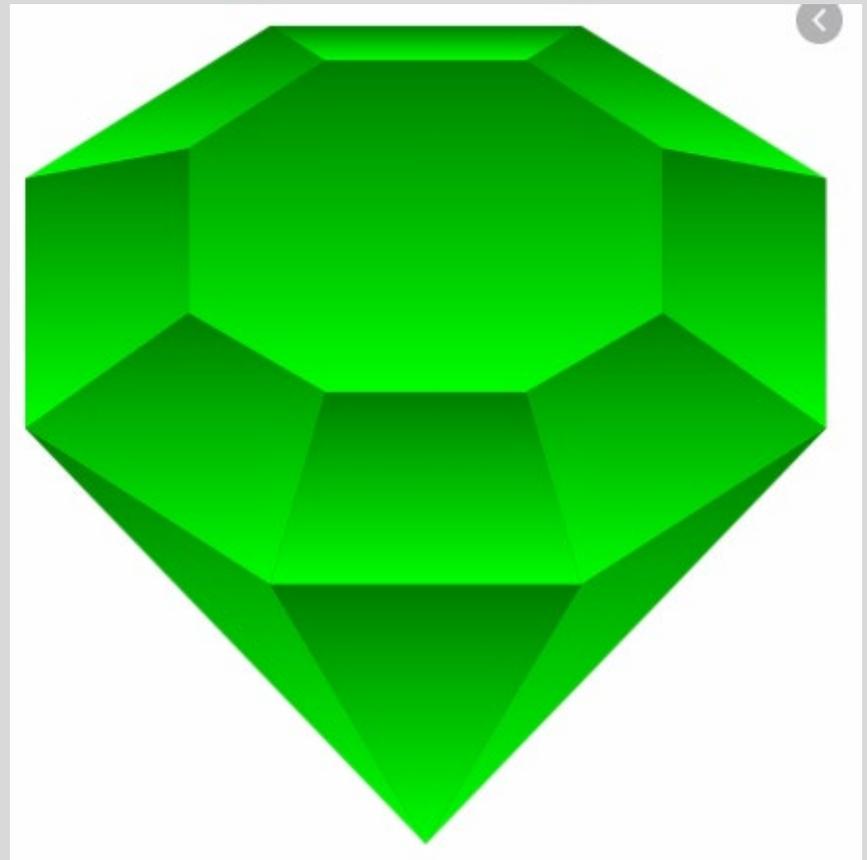
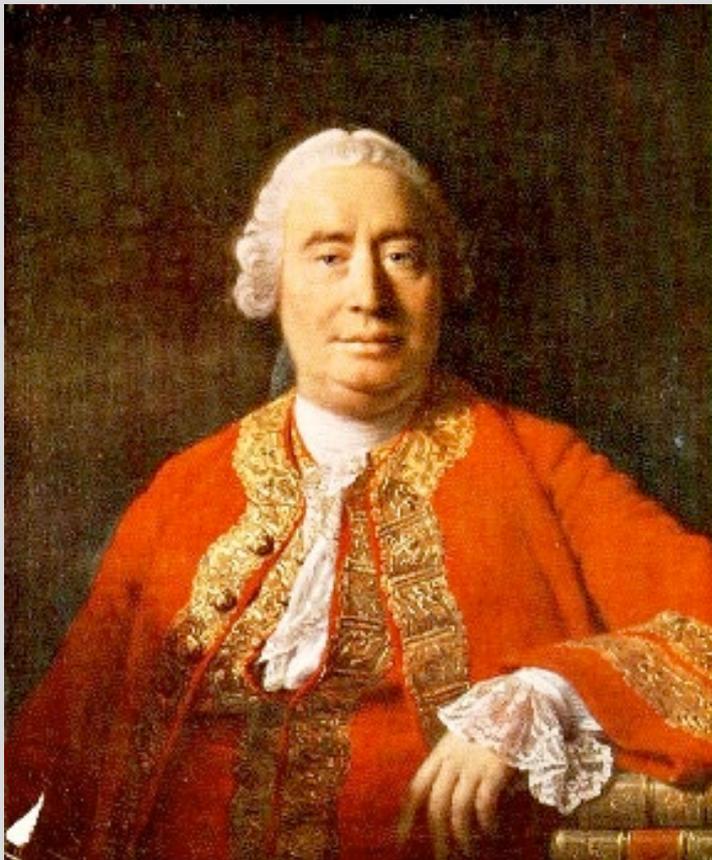
$$\sim Q$$

---

$$\therefore \sim P$$



# Problem of induction

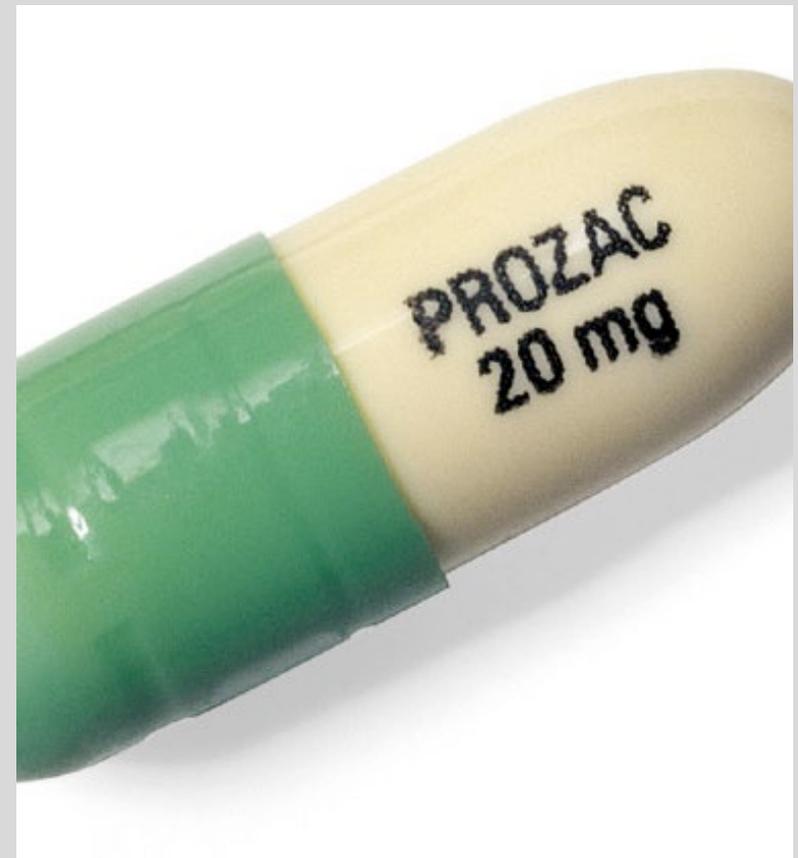


# Popper and falsification

- There's science and pseudo-science
- Pseudoscience verifies
- Science seeks to falsify
- The problem of induction is irrefutable, but irrelevant
  - It only applies to pseudo-science!

# Example of a hypothesis test in medicine

- Null: Prozac is no better than placebo for treating depression.
- H: Prozac works “significantly” better, we *reject (falsify) the null hypothesis*.
- We never confirm the alternative hypothesis, at least in statistical theory.



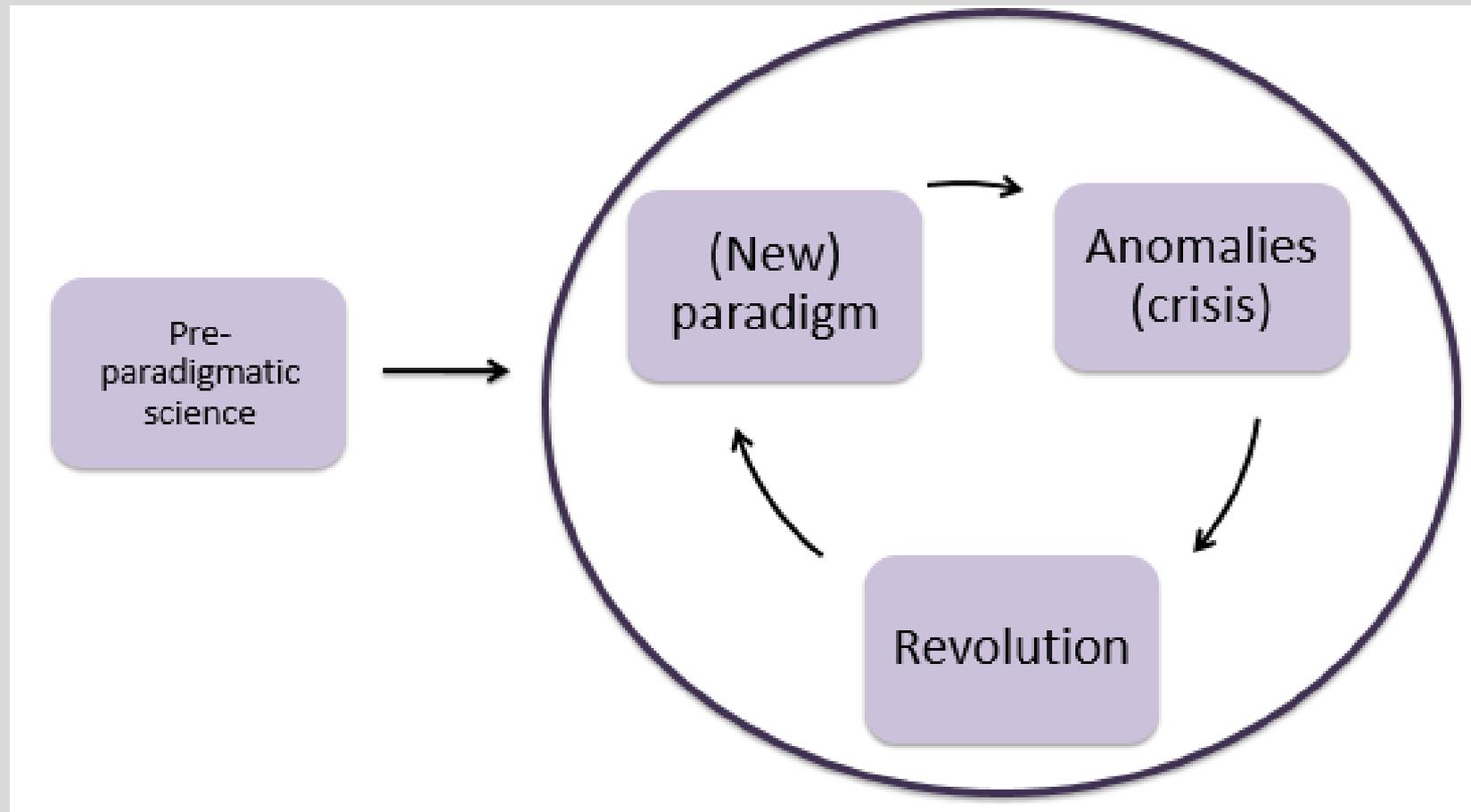
# Kuhn on falsification

- So, scientists are super critical and always questioning everything, right?

Nope!

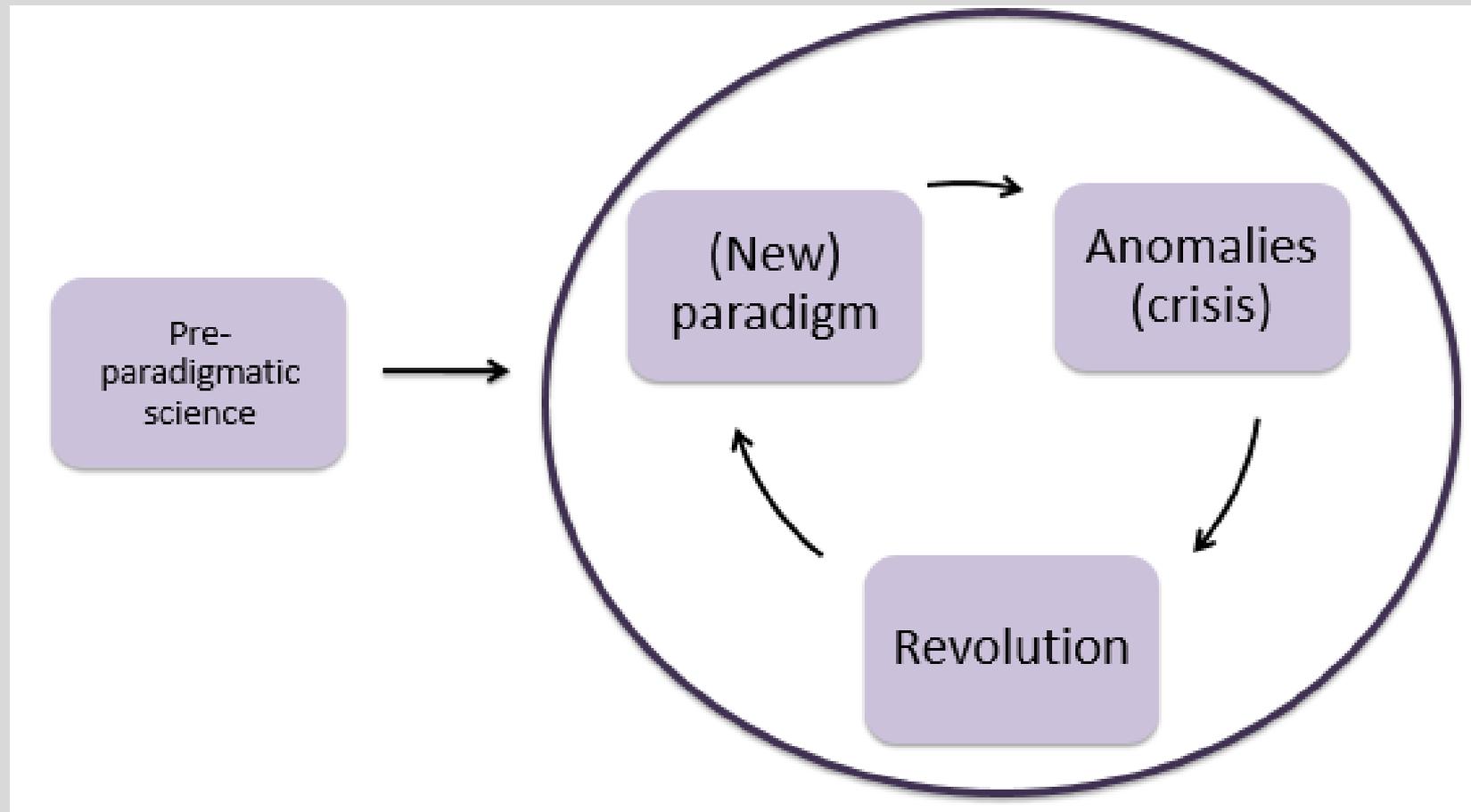


# Kuhn and scientific progress

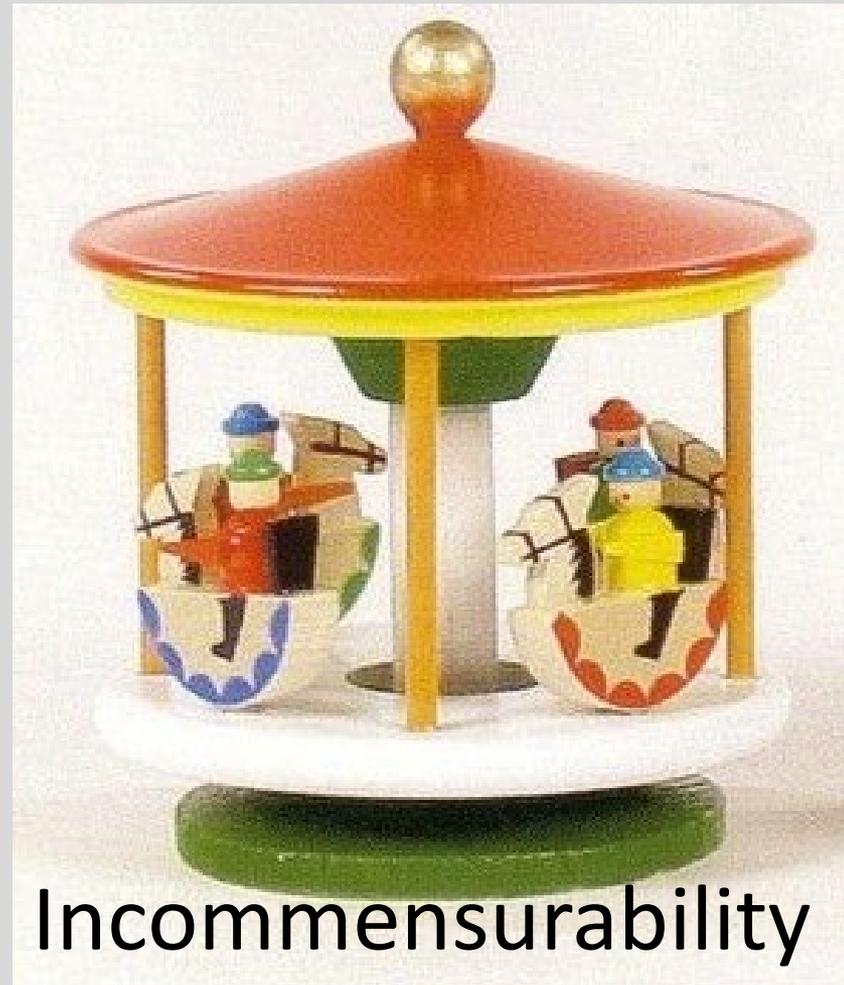




# Kuhn and scientific progress



# So what is scientific progress?



# Realism & Scepticism

- Realism & antirealism in Philosophy
- Scepticism
  - Descartes
  - Theoretical under-determination
  - Pessimistic meta-induction
    - “The history of science is a graveyard of dead theories” (Laudan 1981)
- Does this matter?!

# What is the place of philosophy in science?

- What do we *want* from it?
- What do we *need* from it?
- What do we *get* from it?