Scientific realism

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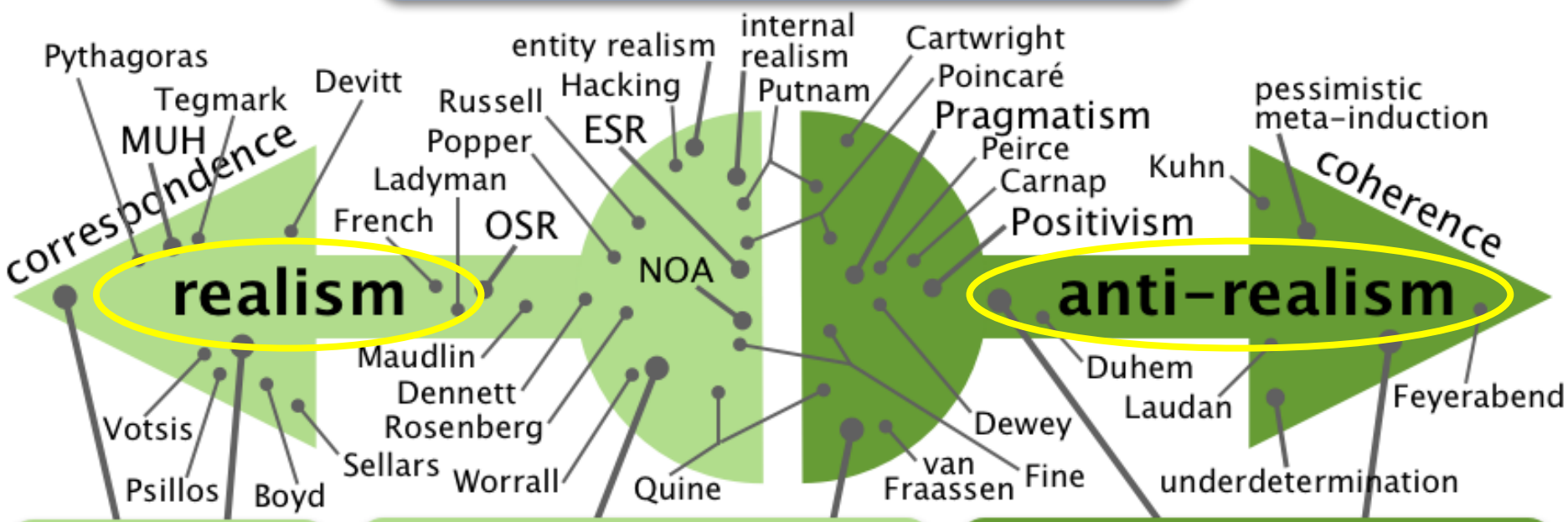
One-minute self-introduction

- PhD from Social and Moral Philosophy, University of Helsinki (2018)
  - *Hijacking Responsibility – Philosophical Studies on Health Distribution* examines the theoretical background for a political trend, the responsibilization of individuals
- BSc in Biology (genetics), then to Practical Philosophy “all the way”
  - Interests: social and distributive justice, philosophical bioethics, philosophy of responsibility, philosophy of technology, science and technology studies
- I am at Aalto because Matti recruited me on a project on justice studies (2015). Later, we continued with justice studies applied to bioeconomy. My current project is on the normative effect of technological expectations in sustainable transitions.
- I teach ethics to pharmacy students, ethics to philosophy students (UH), and these couple of lectures (Aalto).

philosophy of science



Naive Realism

The world I see is real. What are you all arguing about?

Structural Realism

Science has identified real patterns, relationships, and structures (at least within a regime) in nature.

Instrumentalism

Theoretical concepts may have use in predicting observations, but we have no ontological commitments to them.

Scientific Realism

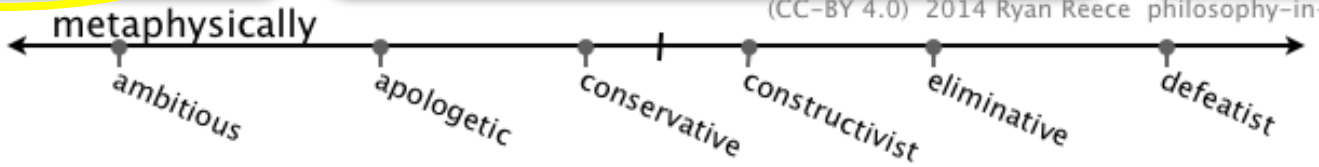
Science makes real progress in describing real features of the world.

Constructive Empiricism

Science aims to give us theories which are empirically adequate, but does not justify metaphysical claims about reality.

Relativism

Social constructivism. Epistemological anarchism.



Motivational issues

- What we think of scientific theories, affects our thinking
  - Scientific claims, practices and ideas have an influence on public policies, social values informing policy, informal policies, cultural ideals (Longino)
- The authority to human thinking?
  - Common thinking (world is made of mid-sized objects, habits, communities, moral norms, intentions, beliefs…)
  - Scientific thinking (with unobservable items such as quarks, surplus value, interest, anything that doesn't reduce to observable terms)

Questions for your research settings

- If you believe or do not believe in a theory,
  - What parts of it you could or could not commit to?
  - What kind of assumptions of entities, structures, explanations does it have?
  - What semantic, epistemological, and ontological commitments does it have?
  - Are you looking for building blocks or causalities? Why?
  - What do you believe is ”true” in the theory? Would that exist even without the theory? Even if you don't think of it? Even if you don't hope for it?
  - Where do you think the ontological authority to human thinking lies? Why?
- What questions are important? What connections are meaningful? Why? Why not?

Political-historical background

1800s positivism and enlightenment

Skientism & naturalism: Take off supernatural stuff!

Human thinking develops towards a ”positive” phase from primitivity

Washing metaphysical and theological waste out of sciences, organizing society accordingly

1920s/30s modern logical positivism (The Vienna Circle)

Knowledge of world must be built on experience and observation, not mere thinking and tradition (….in 1920s German-speaking areas….)

Verificationism
All claims must be verified with observation
Strict semantic empiricism
All terms must be intersubjetive and objective
Unity of sciences
All empirical problems can be formulated with neutral language independent of discipline

Critique and collapse

→ **Scientific realism**
Evolves from the ruins of logical positivism. Unobservables are ok!

By 1930s, most had abandoned the central thesis of logical positivism - but science still carries some of its load

Defends science and its cultural authority against science skeptics

Basic thesis of scientific realism

- A positive epistemic attitude towards the outputs of scientific investigation, regarding both **observable** and **unobservable** aspects of the world
- Best theories and models of science can produce knowledge and truth about the world, and they are mostly true

- This concerns only the mature theories
  - Been around for a long time, attained consensus, rigorous testing
- Mature theories do not have to be completely true.
  - They can be approximately true and become increasingly true as science develops

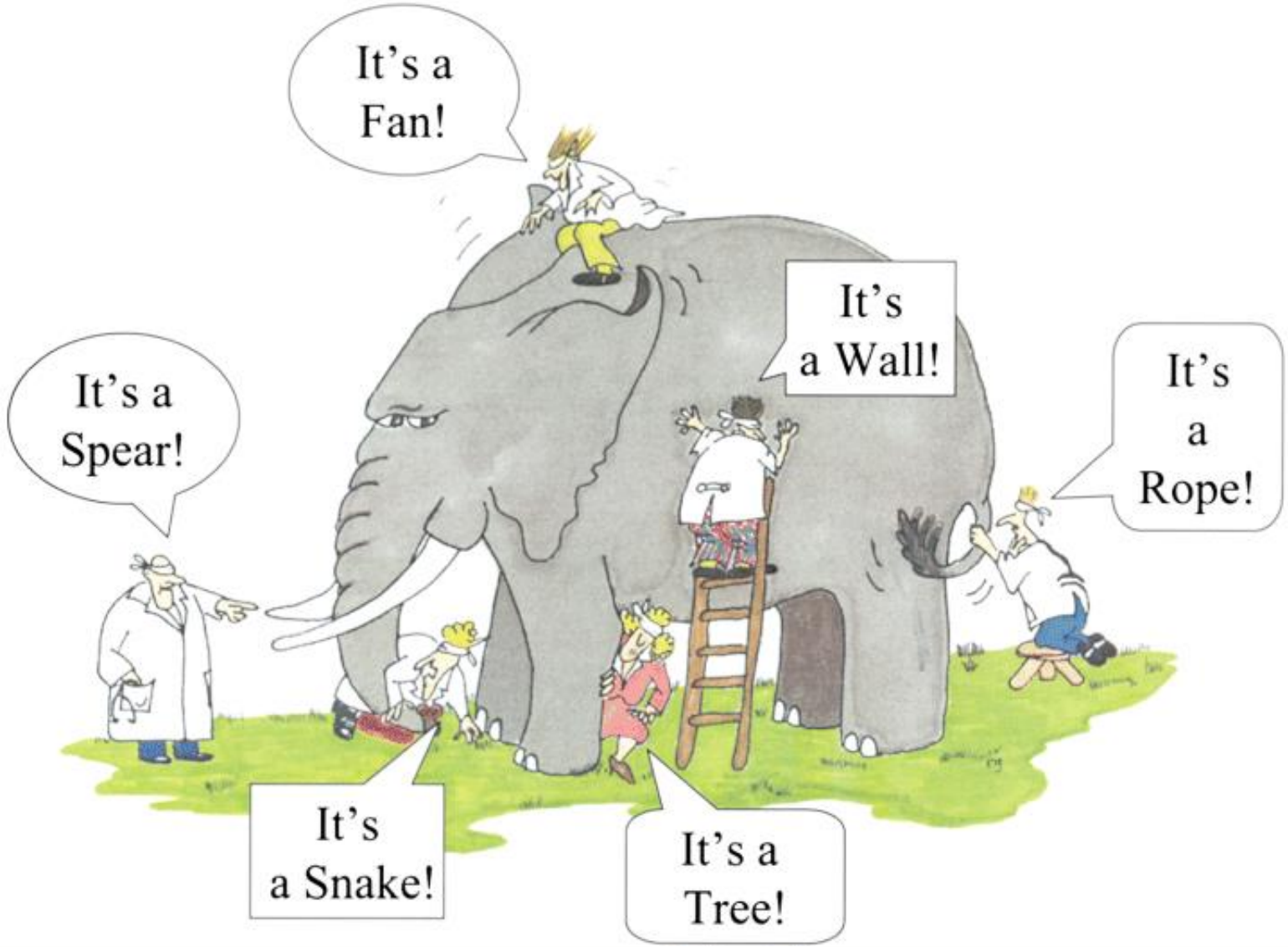
Core dimensions of scientific realism

Ontological commitment What actually exists?	Epistemic commitment Does science produce knowledge?	Semantic commitment What do the statements mean?
”There is a mind-independent world and it can be investigated by science” Note: Towards what you are realist is most likely what you aim to find. Scientific unobservables constitute our observables, because they… - Aggregate them (building blocks)? - Have causal powers to them (causations)?	**”Science gives us knowledge about the mind-independent world”** Theoretical claims and scientific knowledge give the truth or approximate truth about the world	**”Scientific claims should be taken literally, at face-value”** There is a successful reference of theoretical terms to things in the world (semantics: the relation between the world and language) Most current theories are true descriptions of the world
Contrast: anti-realist accounts, e.g., traditional idealism, phenomenalism Things only exist in our minds	**Contrast: Skepticism** There can’t be sure knowledge	**Contrast: Instrumentalism** Scientific claims are merely useful tools to explanation without literal meaning

Attempts to identify more specifically *the parts of scientific theories* worthy of commitment

Entity realism	**Structural realism**	**Explanationist realism**
Commitment to the entities described by the theory, even if the theoretical descriptions would change (e.g., genes) Realism of those unobservables that can be causally manipulated. "If you can spray them, they are real" Can be agnostic about the theory itself ("humans exist, but sociological theory might be false")	Realism to structure and relations Can be sceptic about entities, but realist about theoretical or mathematical structure (the angles of light, laws of light)	Realism towards those parts of best theories that are most important to explaining their empirical success

Different views are OK in different contexts!


It's a Fan!
It's a Spear!
It's a Wall!
It's a Rope!
It's a Snake!
It's a Tree!

Arguments in favour

- The miracle argument
  - Realism is the only philosophy that doesn't make the success of science a miracle
- Corroboration
  - The detection of an unobservable with many different instruments or experiment makes it more credible (cf. Triangulation)
- Selective optimism/scepticism
  - Aspects of theories (explanationist, entity, and structural realism) are true or close to truth, all of those don’t have to be true

Arguments against

- The data tells insufficiently about which theory to believe *(The Duhem-Quine thesis/underdetermination of theory by data)*
  - Testing a single hypothesis requires a host of background information: experimental apparatus, what data are relevant, what must be controlled for…
  - Conformational holism: A theory is a web of beliefs. Empirical tests do not confirm or disconfirm individual beliefs, but rather the set of one's beliefs as a whole. Thus, how can we know where the error (or evidence) is?
    - The link between theory and reality can generate success in many ways
    - Bits and parts of a theory, or beliefs about observation can be "corrected"
    - Theories can be saved in multiple ways (which can be contradictory)

Arguments against

- Skepticism about inference to he “best” explanation
  - You need some criteria to infer the “best”, and which are the criteria? Simplicity, consistency, coherence, scope… *FT50?*
  - What do these mean? Why are they indications of truth?
  - How to identify those theories that realists should be realists about?
- The pessimistic induction from the history of science
  - Old theories are regularly turned over, the history is full of falsely postulated unobservables, and many past theories have been false
  - So why would THIS theory be true?
- Social constructionism
  - Scientific knowledge does not develop in a linear manner – it is constructed in a historical, societal, and cultural context, as a response to (certain) human interests: Science is not a linear development of facts.
  - To which science does problem X belong? Which science will get most attention and resources? What choices and values preceded this science?

Most are scientific realists, to a degree

- More-or-less is the relevant discussion, not either-or
  - Many, or most, critical views are compatible with scientific realism and its basic thesis
  - E.g. criticial realism applied to scientific realism: critical scientific realism (the truth-like development of theories)
- E.g. Godfrey-Smith and a very modest version
  - We don’t have to know the right level of confidence to current science
  - “The world is out there, existing regardless what we think about it. We all have a common reality, which has a structure that exists independent of what we say and think about it. Expect insofar a certain reality is causally affected by thoughts, symbols, theories”

Too much optimism / pessimism is the problem

- Non-critical views of science fail to see that scientific institutions are social institutions with all their social processes
- Too-critical views fail to see that the scientific method *can often* produce the best and reliable version of ”the reality” for the time being
- How can we know what is good and what is bad science?
  - Kincaid: Symptoms of good science
  - “Although we know objectivity cannot be guaranteed, the ideal of unbiased, disinterested pursuit of the truth is the hallmark of science. **Science is objective when our beliefs reliably indicate the way the world is rather than the way we want the world to be**“
- Longino: Science is a historical product of interactions between contextual factors such as social needs, political needs, values, and traditions
  - These might create a climate in which the assumptions that shape the research are taken for granted, immune from scrutiny

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