

Scientific Disagreements: Epistemological and Inquisitive Considerations

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based on research done together with Christian Straßer (RUB), and Jan Willem Wieland from VU University Amsterdam

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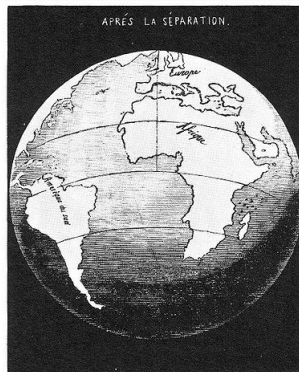
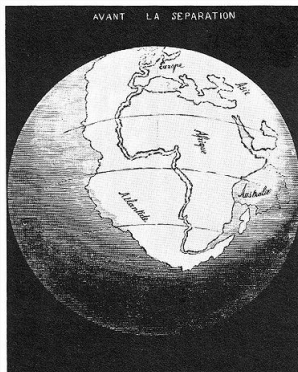
Introduction

So far in this course:

- Social-epistemic reasons that inform expert judgment
- Especially relevant if scientists disagree (Fleisher et al., 2025; Friedman and Šešelja, 2023)
- They inform how a peer disagreement impacts
 - my stance towards my own theory
 - my stance towards my opponent's theory.

Examples of scientific disagreements?

Another example of a scientific controversy



Continental drift debate

1912: A. Wegener – the theory of continental drift

Let's start with an example of a scientific controversy

Continental drift debate

- The main problem: the mechanism of the drift.
- early 1920s – additional evidence (A. du Toit)
- late 1920s – solutions for the mechanism proposed (A. Holmes)
- Šešelja and Weber, 2012: the research program was worthy of pursuit in view of the arguments available at the time.
- Nevertheless, a number of North-American earth scientists considered the theory epistemically futile and even ridiculed it.
- As a result: the research was largely abandoned for 30 years, until its comeback in the 1960s: the theory of plate tectonics.

The upshot

- North-American scientists didn't tolerate the drift research program
- The disagreement led to a set-back in inquiry.

Scientific Disagreements

- one of the key conditions of scientific progress (e.g. Kuhn, 1977, Longino, 2002, Solomon, 2006)
- however: dangers of inappropriate responses to a disagreement
 1. premature rejection of fruitful inquiries
 2. anything goes
 3. fragmentation of scientific domains

Which epistemic and inquisitive norms should guide scientists in case they disagree?

Introduction

Epistemic vs. Inquisitive (Zetetic) Norms

Rational Disagreement

From Rational Disagreements to Epistemic Tolerance

Epistemic Toleration

An Example

Outline

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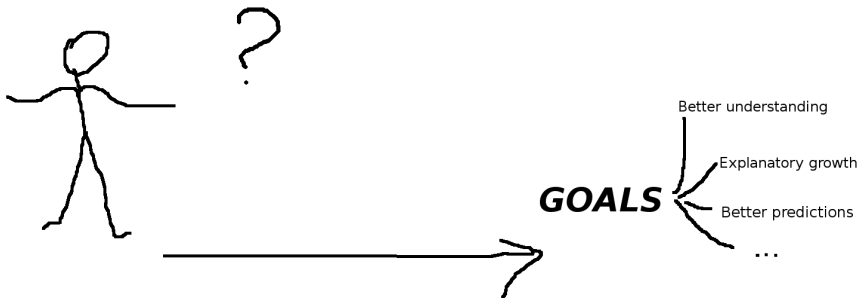
Epistemic norms

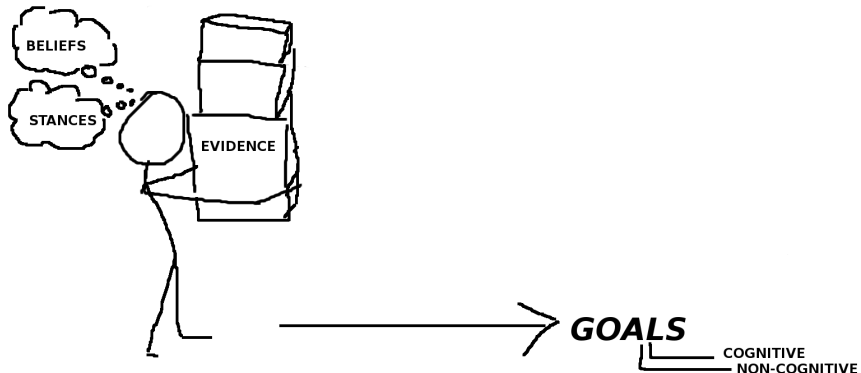
- What should I believe? What should I accept as scientific knowledge?
- Epistemic rationality



Inquisitive (zetetic) norms

- What should I do to achieve scientific goals?
- Instrumental rationality





Questions raised in scientific disagreements

Towards my own inquiry

- How should I adjust my beliefs given that my peers disagree with me?

▮▮▮▮▮ ➤ Epistemology of peer-disagreement

Towards my own inquiry

- Steadfast Norm: I should stick to my guns.
- Conciliatory Norm: I should in some sense weaken by belief.

Questions raised in scientific disagreements

Towards my opponent's inquiry

- Is my opponent's stance rational (epistemically justified)?
- Should I tolerate my opponent's stance? engage in a discussion? or simply ignore her?

▶ The topic of today's lecture.

Pluralists' view on disagreements

- Scientific pluralism as a normative stance
- Kitcher, Longino, Chang, Lacey.
- disagreeing scientists *should tolerate* each other inquiries

Scientific pluralism and toleration



S

tolerate?

T



- commitment towards *S*
- disagrees with *T*
- commitment towards *T*
- disagrees with *S*

Important questions for Pluralism:

1. What is the epistemic nature of this tension?
2. What does it mean then to tolerate another stance?
3. In which situations should we tolerate?

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When is a disagreement rational?

Rational Disagreement (RD) – schematic definition

RD1 There is a disagreement concerning some issue A (factual, methodological, axiological etc. stances of scientists).

RD2 There are reasons to suppose that the stance of each participant is the result of a rational deliberation.

Further conditions:

- The disagreeing parties are **epistemic peers**
- The RD is recognized **externally** or **internally**.

What makes Rational Disagreements possible?

- Different experiential histories (Rescher, 1993)
- Different bodies of evidence that inform us about what is correct reasoning, correct methods, etc. (Goldman, 2010)
- Different interpretations of evidence, etc.

Concerning the Recognition of RDs

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Can RDs ever be recognized?! (McMahon, 2005)

- Either you're an expert in the debate and you already took a side and you're convinced that the other side is wrong and thus insufficiently rational,
- Or you lack the expertise to adequately judge whether each of the parties is rational.

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Is there any way out of this dilemma?

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▮► Indices (indicators) of Rational Disagreement

Indices of Rational Disagreement

- **Content-based indices:** by analyzing the content of the disagreement
- **Form-based indices:** by analyzing the formal features of the disagreement

Indices of Rational Disagreement: Content Based

Gained by analyzing the argumentative content of the controversy.

Scientists might prefer different epistemic values

- Kuhn on epistemic/cognitive values
- e.g. T_1 might have a greater scope, while T_2 might be more coherent with accepted scientific knowledge
- Recall the aerosol controversy: empirical adequacy vs. explanatory power.

But: this analysis is external!

Suppose we were to tell the WHO and aerosol scientists that they are simply involved in a rational disagreement...

If the content-based criteria are not accessible/recognized as indices of rationality, is there another way to recognize a rational disagreement internally?

Form-Based Indices

- length of the debate
- expertise
- number of experts

Content and form-based indices: **higher-order evidence** of RD

- They are not direct evidence that either side is reasoning rationally.
- But: they are typical features of rational disagreements.
- As such, they suggest that this may be the case of a rational disagreement.

The internal tension RDs

For disagreeing scientists there is thus the tension between:

1. the evidence regarding the subject of disagreement (“I am right, they are wrong.”)
 2. the evidence regarding the possibility of this being a rational disagreement.
- ▮► the tension between the first-order and the higher-order evidence.

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Epistemic tension in a rational disagreement:

- A scientist is convinced of her own stance and thus finds the stance of her opponent epistemically *objectionable*
- There are indices that she may be involved in a rational disagreement. Hence, the opponent's stance is in a specific sense *admissible*
- Hence, my opponent's views are not epistemically futile or *inadmissible*.

These three components – *objection*, *admission*, and *non-admission-as-limit*

➡ **toleration** (Forst, 2004)

Epistemic character of toleration:

- each of the three components is based on epistemic concerns;
- the normative consequences: epistemic and methodological (zetetic), rather than ethical.

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Epistemic toleration as a conditional norm: (in view of Forst, 2004)

1. **Objection criterion**: the tolerated stance is considered objectionable and in an important sense epistemically problematic.
2. **Admission criterion**: there are certain positive reasons – namely, the indices of rational disagreement – in view of which it would be wrong not to tolerate an objectionable stance.
3. **Disavowal criterion**: there are negative reasons to consider the stance of the opponent as futile and that thus specify the limits of toleration.

Epistemic Toleration

TOL1 I have a duty to consider my opponent's stance in a charitable way as potentially rational, i.e. potentially non-futile;

TOL2

1. the duty to consider the opponent's stance as a potentially serious competition and challenge to my own stance; and
2. the duty to stay in critical correspondence with the opponent.

Toleration  **Interaction**

TOL1

Why should we at all consider our opponent's stance as potentially non-futile although we clearly disagree with it?

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Epistemic norm

There are indices that my stance is wrong and yours is right.

TOL1

Examples:

- chemical revolution: phlogistonist system was prematurely dismissed (see Chang, 2012)
- continental drift debate (Šešelja and Weber, 2012)
- research on peptic ulcer disease (Šešelja and Straßer, 2014)
- agroecology (see Lacey, 2012)

TOL1

Examples:

- chemical revolution: phlogistonist system was prematurely dismissed (see Chang, 2012)
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- agroecology (see Lacey, 2012)

My stance may be biased (Pronin et al., 2002), Wilholt, 2009, Douglas, 2009, –**carrier2013values**”)

Epistemic and a zetetic norm

- (a) Epistemic norm: I have a duty to consider the opponent's stance as a potentially serious competition and challenge to my own stance
- (b) Zetetic norm: I have a duty to stay in critical correspondence with the opponent.

Motivated by the goal of epistemic improvement.

(cp. Douglas' notions of detached and interactive objectivity)

The value of critical interaction

The clash of opposing arguments promotes sound reasoning. It exposes bias and other sources of incompetence in reasoning. (McMahon, 2005, p. 26)

Practical consequences

- tolerating scientists are not to ignore the presence of the tolerated inquiries, or publicly dismiss them as epistemically futile
- in conference presentations, publications, teaching, decisions about research funds, etc.
- journal editors or conference organizers should not disqualify participants merely due to them belonging to an opposing camp of scientists
- journals editors are motivated to invite and encourage discussions among members of rivaling camps, such as commentaries on each others papers in order to encourage toleration in scientific practice
- conference organizers are motivated to ensure that information flow between opposing camps is encouraged.

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Not a trivial matter – example of PUD

Research on peptic ulcer disease (PUD) in the 1950s

- end of the XIX century: two hypotheses: the bacterial and the acidity one.
- in 1954: E. Palmer's large scale study which functioned as a refutation of the bacterial hypothesis.
- 1980s: Warren and Marshall's discovery of *Helicobacter pylori*
- However, as we show in Šešelja and Straßer, 2014, Palmer's study was based on a method that was known to be unreliable at the time;
- Moreover, the bacterial hypothesis had both the positive and the negative heuristics in the 1950s. Nevertheless, it was largely abandoned.

Not a trivial matter – example of PUD

- The bacterial hypothesis was not only ignored (in both research and textbooks), but attempts at implementing it in the medical practice were ridiculed
- The case of the Greek doctor John Lykoudis
- Even Warren and Marshall's submission of their results to the major conference of the Gastroenterology Society of Australia in 1983 was rejected:

our abstract was not accepted, with the condolence letter from the secretary stating that, 'of 67 abstracts submitted we could only accept 56', thus our material must have been rated in the bottom 10%! Marshall, 2002, p. 184

Thank you!

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