There is nothing as practical as a good philosophy

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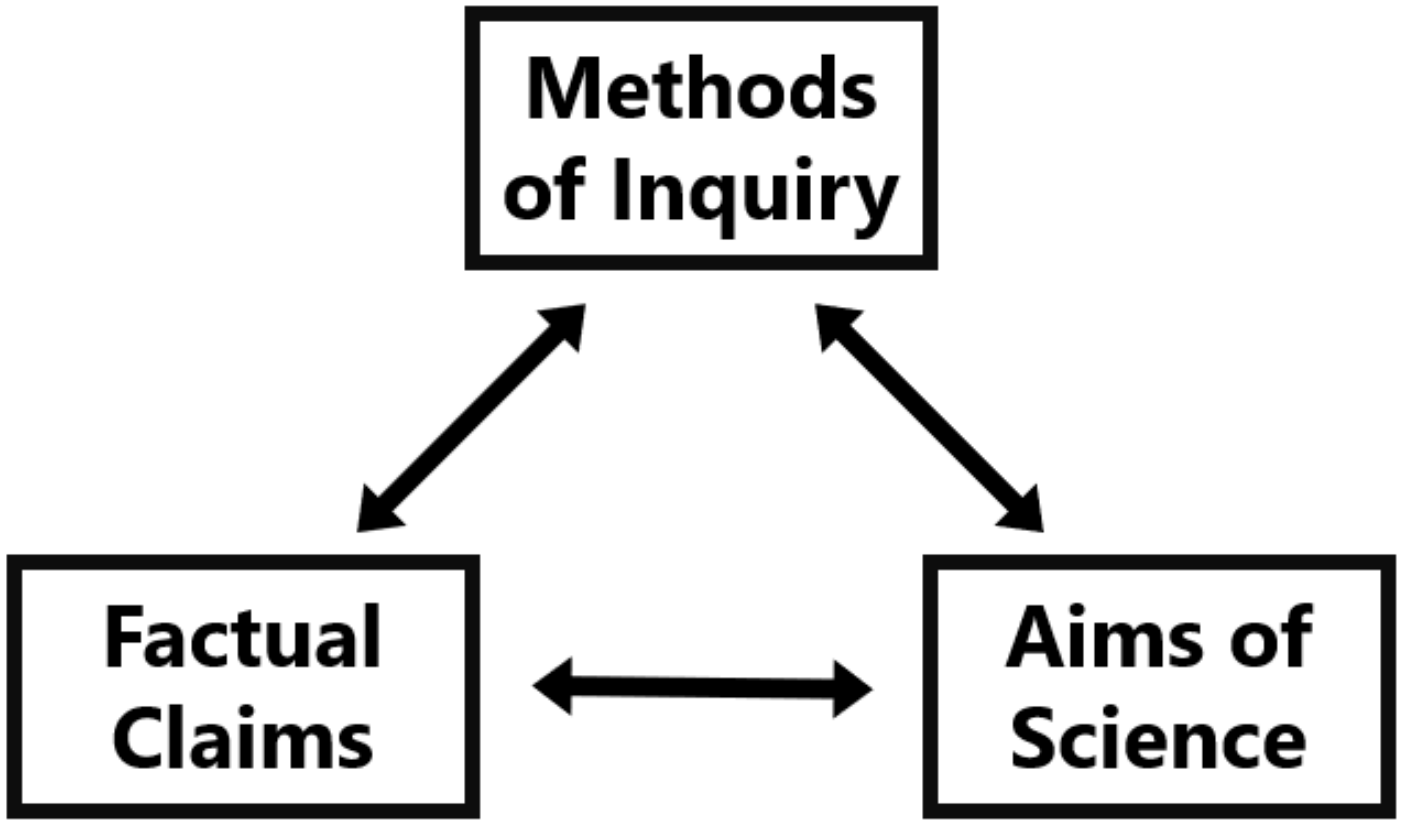
An empirical researcher naïve enough to ask a statistician how they should analyze their data is almost certain to receive the answer ‘it depends’.

Are you testing, or estimating? Predicting, describing, or explaining? Are you using a frequentist, Bayesian, or likelihood approach? What is the factual claim you want to make?

How do researchers choose which question to ask?

And what if different people, who ask different questions, make different factual claims?

The questions we ask are partly determined by which methods we deem viable in a certain field, and facts might make us decide some aims can not be achieved.



Laudan, 1986

This often leaves enough room to choose which aims we have.

The choice which question you ask is partly determined by your philosophy of science (whether you think about it or not!)

For example, you might believe scientific knowledge is generated inductively through Bayesian confirmation theory, where the idea is that scientists update their belief until they reach consensus about factual claims.

Earman, 1992

Your philosophy of science will impact the methods you use, the factual claims you make, and the questions you think a scientist should ask.

The choice for a philosophy of science can be based on values, or on beliefs about the efficiency of a certain approach to knowledge generation. Could be studied, too difficult in practice, so subjective.

1. Popper dismisses subjective beliefs, because:
2. Claims should be inter-subjectively testable.
3. Inter-subjective testability enables scientists to criticize each other.
4. Criticism is essential te prevent dogmatic thinking.
5. Preventing dogmatic thinking is important for development and growth.

If you have a different view on how development and growth occurs, and this does not depend on criticism and inter-subjective testability, you might allow subjective beliefs into claim-making.

Importantly, the reason Popper is not a Bayesian has nothing to do with statistical properties. We do not determine which methods to use based on properties of the methods, but based on our aims.

Which statistical approaches we should use is not a question for a statistician but a question for a philosopher of science.

Gelman and colleagues (2013, p. 182) on Bayes factors: *"This fully Bayesian approach has some appeal but we generally do not recommend it because, in practice, the marginal likelihood is highly sensitive to aspects of the model that are typically assigned arbitrarily and are untestable from data."*

However, this criticism is not relevant for a researcher who subscribes to a philosophy of science where the epistemic aim is to update subjective beliefs based on observed evidence (e.g., Morey et al., 2016).

It is not the job of a statistician to tell researchers which aims they have. Instead, their job is to advise researchers which methods to use, given the aims these researchers have and the claims they want to make.

The Statistician's Fallacy:

What's wrong with NHST? Well, among many other things, it does not tell us what we want to know, and we so much want to know what we want to know that, out of desperation, we nevertheless believe that it does! What we want to know is "Given these data, what is the probability that H_0 is true?" But as most of us know, what it tells us is "Given that H_0 is true, what is the probability of these (or more extreme) data?" These are not the same,

Cohen, 1994

An example: Dichotomous claims.

Based on methodological falsificationism where we aim to refute universal statements. If P, then Q, not Q, therefore not P. This does not work if ‘probably not Q’.

So we need to turn probabilistic data into a basic statement (with a truth value). We do this through methodological procedures (such as a Neyman-Pearson hypothesis test).

You are free to not be a methodological falsificationist. But if you are one, you believe that we generate knowledge through conjectures and refutations based on dichotomous claims.

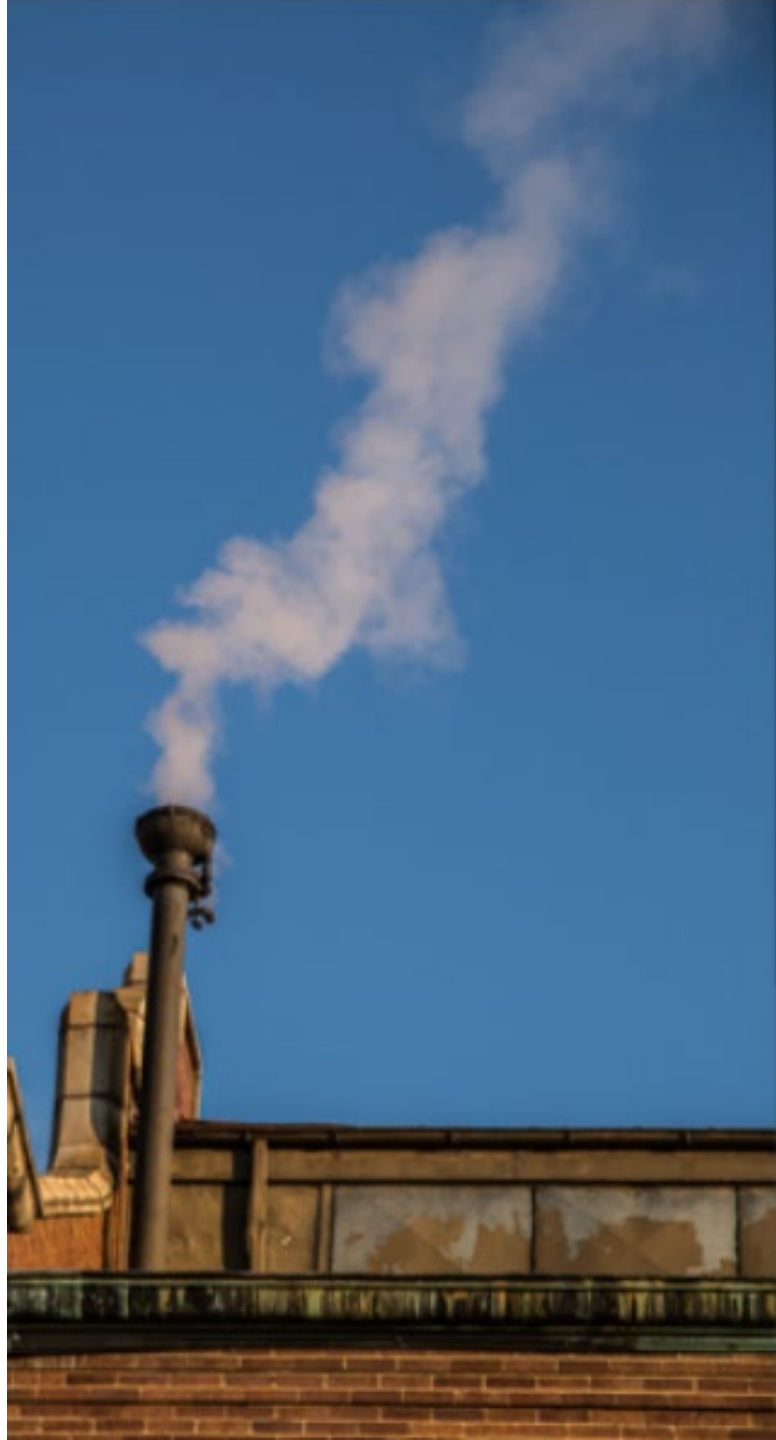
Uygun-Tunç, Tunç, & Lakens, 2023

Why have scientists not worked out coherent sets of aims, methods, and claims? Because there is no engagement with philosophy of science, and it goes against our reward structures.

Statisticians get more rewards for developing new statistical quantities (even though most do not survive) than to resolve the weak use of established statistical quantities.

Empirical scientists are grateful for our continued disagreements, because ‘if even statisticians don’t agree on what is best’ they can keep using their bad practices.

Teams of statisticians, philosophers of science, and content experts can develop coherent questions to ask for specific research areas.



Thanks!

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