Values in Science beyond Underdetermination and Inductive Risk

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1 Intro

The ultimate goal is to understand the structure of values in science (Douglas), i.e., the role of values in the logic of scientific practice (vs. strategic arguments).

What is needed is not a descriptive account, but a normative ideal for the practice of science—both epistemic and ethical.

Some phases of inquiry where values might play a role:

1. Research agenda.
2. Framing the problem.
3. Methods & data characterization.
4. Hypothesis / explanation.
5. **Testing / certification**
6. Application & dissemination.

I'll focus on *testing*, the evaluation of evidential support for a hypothesis and its *certification* (or not) as *knowledge*.

This is the most central arena for discussion value-free vs. value-laden science (re: the old *context of justification*).

Certification is a complex, progressive, social matter (Kitcher 2011), but it is an actual act that occurs within concrete inquiries conducted by particular scientists.

2 Underdetermination: The Gap Argument

Underdetermination arguments for the value-ladenness of science extend Duhem's & Quine's thoughts about testing.

The many forms of underdetermination argument have in common the idea that some *gap* exists between theory & observation.

The gap may be the need for auxiliary assumptions in order for theories to generate testable hypotheses, or choice between identically confirmed rival theories, etc.

Feminists, pragmatists, and others have sought to fill that gap with social values, or to argue that doing so does not violate rational prescriptions on scientific inference. Call this **the gap argument** for value-laden science (Intemann 2005).

It has been argued that highly controversial *permanent* or *global* forms of underdetermination are needed to defeat the value-free ideal of science (Kitcher 2001).

On the contrary, *transient underdetermination* is sufficient to establish that science is value-laden. (Howard 2009; Biddle)

What matters are decisions made in practice by actual scientists, and at least in many areas of cutting edge and policy-relevant science, transient underdetermination is pervasive.

Once the existing evidence is in, it can be legitimate to fill the gap with values—e.g., one might accept a compatible hypothesis that is likely to do the least harm to egalitarian social ideals.

Ensuring that no values enter into decisions to accept / reject hypotheses is *impossible*. Withholding judgment until transient underdetermination can be overcome is (in many cases) *unreasonable* (Biddle).

What distinguishes *legitimate* from *illegitimate* uses of values to fill the gap is a matter of controversy, sometimes left unspecified, but with a few exceptions, underdeterminationists insist that values *only* come into play in filling the gap.

3 Inductive Risk: The Error Argument

H. Douglas has revived the argument of W. James (1896); Rudner (1953); & Hempel (1965) against value-free science.

In accepting/rejecting hypotheses, scientists can never have complete certainty that they are making the right choice.

So inquirers must decide whether there is *enough* evidence to accept/reject the hypothesis. (e.g., tradeoff of α & β)

What counts as enough should be determined by how *important* the question is, i.e., the *seriousness* of making a mistake.

That importance or seriousness is in part an *ethical* question, dependent on the ethical evaluation of the consequences of error. Call this **the error argument** for the value-ladenness of science (Elliott 2011).

Values should not be taken as *reasons* for accepting / rejecting the hypothesis, on a par with *evidence*. This is an impermissible *direct* role for values.

In their permissible *indirect* role, values help determine the rules of scientific *method*, e.g., rules about how many false positives or false negatives to accept.

Withholding judgment about hypothesis, and instead asserting only the probability that the hypothesis is true, does not eliminate inductive risk and thus the need for values.

First, because inductive risks occur in prior phases of the inquiry, and second, because probability statements may be open to inductive risks.

4 A Shared Premise

These two arguments against the value-free ideal of science share a common premise.

The gap argument holds that values can play a role in the space fixed by the evidence; if the gap narrows, there are fewer ways in which values can play a role, and if the gap closes, the conclusion must be value-free.

The error argument allows values to play a role in decisions about how to manage uncertainty—not directly by telling us which option to pick, but indirectly in determining how much uncertainty is acceptable.

Both arguments take evidence as fixed in the context of certification, and values play a role in the space left over—they assume **the lexical priority of evidence over values**.

This premise guarantees that even in value-laden science, values do not compete with evidence when the two conflict.

5 Why Priority?

Why such a strict priority of evidence over values? One obvious possibility concerns the *objectivity* of science.

This isn't quite right, as most of the opponents of the value-free ideal we're concerned with hold that science is still objective, that values & objectivity are not in conflict *as such*.

The key concern is that value judgments might "drive inquiry to a predetermined conclusion"(Anderson), that inquirers might rig the game in favor of their preferred values.

Douglas (2009): "Values are not evidence; wishing does not make it so."

In other words, a core value of science is its ability to *surprise* us, to force us to revise our thinking. Call the threat of values interfering with this process **the problem of wishful thinking**.

Lexical priority of evidence provides a *prima facie* good way of avoiding this problem.

6 Problems with Priority

Two related issues:

(1) In the certification phase, these arguments that assume the lexical priority of evidence take a relatively uncritical stance towards the evidence.

Lexical priority treats testing as, given the evidence, what should we make of our hypothesis? Values play a role at the margins of that process.

We already have reason to adopt a more egalitarian attitude about the process (cf. critics of strict falsificationism and empiricism).

(2) The lexical priority assumption also reduces the idea of value *judgment* to merely expression of *preferences* rather than proper judgment—it denies that evidence, reliability, or objectivity play a role in value formation.

Such accounts fail to make the important distinction between *valuing*–mere preference–and *value judgment*–a reflective decision based on reasons.

Further, it may be possible to provide empirical evidence for value judgments, giving further reason to treat them on par with hypotheses, background assumptions, and bodies of evidence (Anderson 2004).

7 Avoiding Wishful Thinking without Priority

If we reject the lexical priority assumption and adopt a more egalitarian model of testing, how can we avoid the problem of wishful thinking?

(1) An alternative principle to lexical priority is **the joint necessity of evidence and values**, which requires joint satisfaction of epistemic criteria and social values.

This leaves open the question of what to do when evidence and values clash.

One option is to remain *dogmatic* about both epistemic criteria and social values, and to regard any solution which flouts either as a failure. (Kourany 2010?)

(2) Alternatively, we can adopt **the rational revisability of evidence and values** and revisit and refine our evidence or values.

Both the production of evidence and value formation are rational but fallible processes, open to revision.

Such a view might include the radical Quinean account which inserts values into the web of belief.

The basic account does not prevent wishful thinking, but adding some basic principles like *minimal mutilation* may overcome the problem. (cf. Kitcher 2011)

(3) Instead of Quinean coherentism, we might instead adopt a form of **pragmatist functionalism about inquiry** which differentiates the functional roles of evidence, theory, and values in inquiry.

According to such an account, not only must evidence, theory, and values fit together fit together in their functional roles, they must do so in a way that *actually* resolves the problem that spurred the inquiry.

8 Conclusion

Lexical priority is undesirable, and unnecessary for solving the problem it was intended to solve.

The key to the problem of wishful thinking is that we not predetermine the conclusion of inquiry, that we leave ourself open to surprise.

The real problem is not the insertion of values, but *dogmatism* about values (Anderson 2004).

Notice that the lexical priority of evidence over values coheres best with a *dogmatic* picture of value judgments, and so encourages the illegitimate use of values.

Evidence *may* be rejected because of lack of fit with a favored hypothesis and compelling value-judgments, but *only* so long as one is still able to effectively solve the problem of inquiry.

Selected References

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