

FORMAL EPISTEMOLOGY AS MODELLING

WHY ARGUMENTS FOR PROBABILISM FAIL

INTRO

Probabilism: "If your credences are not probabilities, then there is a way in which your rationality is impugned." - Alan Hájek

"Any adequate epistemology must recognize that opinions come in varying gradations of strength and must make conformity to the axioms of probability a fundamental requirement of rationality for these graded or partial beliefs." - Jim Joyce, citing Richard Jeffrey

Arguments for probabilism:

1. Representation Theorems
2. Accuracy
3. Calibration
4. Dutch Book
5. "Success"

Precise probabilism (PP): Partial beliefs must be representable by a unique probability function, so that every proposition is assigned a single number between 0 and 1

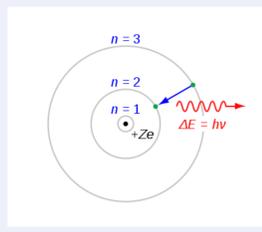
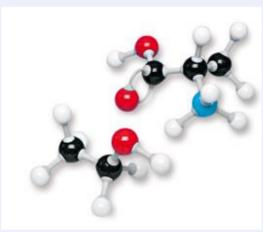
Imprecise probabilism (IP): Partial beliefs must be representable by a set of probability functions, so that every proposition is assigned a set of numbers between 0 and 1 (often an interval)

My argument:

1. Formal epistemology involves modelling, a mode of inquiry familiar from science
2. Methodological constraints block certain model-world inferences
3. Arguments for probabilism are instances of illegitimate model-world inferences

SCIENTIFIC MODELLING

• What are models?



• Lessons from the philosophy of scientific modelling

1 Modelling involves *indirect inquiry*

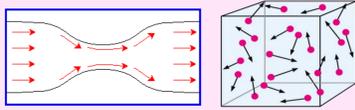
- Study model rather than target system
- Draw inferences from model to target

2 Models present an idealised, distorted picture of the world

- Modellers idealise, approximate, simplify
- Introduces distortions; artefacts emerge

3 Models are built for a purpose, and perform well only within a restricted domain of applicability

- Purpose motivates idealisations
- Model's usefulness is circumscribed
- multiple, disagreeing models of the same system

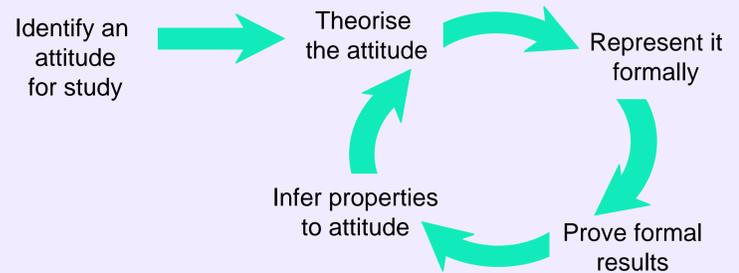


• Learning from models is hard

Inference	Complication when using models
Property X appears in our best account of domain D. Therefore, objects in D have property X	Is X an artefact? Does X depend sensitively on idealisations? Is it found in other models, with different assumptions?
Property X appears in your account. Property X is absurd, so your account is false	Is X an artefact? Is X intended for inference to reality? Does its absurdity matter for the purpose of the model?
Your account doesn't work in case Y. Y is a counterexample, so your account is false	Is Y part of the intended domain of application?

FORMAL EPISTEMOLOGY

• Rational reconstruction of FE method



Identify	Observation: we have partial beliefs, make comparative judgements
Theorise	These <i>partially</i> exemplify the following properties, which we come to identify as putative norms: <ul style="list-style-type: none"> • "Monotonic": we believe weaker prospects to a greater degree than stronger • "Separating": we can "factor out" common prospects when making comparisons • "Transitive"
Represent	<ul style="list-style-type: none"> • Introduce formal object: binary relation \succeq, called "credibility" Defined on a set of propositions, \mathfrak{E}, closed under \models • Endow mathematical properties to match observed/theorised: Monotonic over \models, \vee-Separable, Transitive Assumed to apply perfectly, considered <i>normative</i>. Ideal agent
Prove	<ul style="list-style-type: none"> • Binary relations are difficult to work with • Can we prove a representation theorem? , e.g., Villegas' theorem \succeq is representable (uniquely) by a probability function P $P(\alpha) \geq P(\beta) \Leftrightarrow \alpha \succeq \beta$ • Assuming: \succeq is continuous, complete, and (\mathfrak{E}, \models) forms a complete, atomless Boolean algebra
Infer	<ul style="list-style-type: none"> • Conditional judgements: if your beliefs are like this, then... • Higher-level judgements about the nature of the attitude: Probabilism

• We are modelling

- 1 Indirect: Study \succeq, P in order to learn about agent's attitudes
- 2 Idealised: Monotonic (norm), continuous (not norm), completeness (disputed) → Distorted? Artefacts? Perhaps *real-valued* credences
- 3 Purpose: Study rational structure of the attitude

CONCLUSIONS

1. **Probabilistic credences shouldn't be imputed to agents on the basis of Representation Theorems**
Our formal account of partial belief is a model. Probabilistic credences depend sensitively on idealisations in the model
Modelling view shows: still useful! But not candidates for realist inferences. *Like insisting that water is an incompressible fluid*
2. **A similar line can be run for accuracy (and calibration?) – they too employ idealised models that don't support Probabilism**
The key insight is that the results depend on the idealisations: e.g., a precise numerical value assigned to each proposition
There are similar cases of axioms whose motivation is questioned (e.g., is Joyce's symmetry normative?)
3. **What is on offer here is a methodological insight**
FE is modelling, and this means it comes with a "readymade" methodology, well explored by philosophers of science
Recommends shifting focus from disagreements between models, to the link between idealisations and purposes/applicability
4. **The Precise v. Imprecise Probabilism debate is misguided**
It is like fighting over the two water models. Neither is the "true" account, they aren't even candidates. They're models.
What do they disagree over? Important difference from water case: disagreement over *norm* – permissibility of ambiguity aversion
In a descriptive mode, there is simply no dispute to be had