

# PhD Thesis Abstract

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My research focuses on the philosophical study of rational belief, making use of mathematical tools. In particular, I am interested in the Bayesian approach to rationality, whose principal assumption is that rational beliefs can be modelled using probability theory. Orthodox Bayesianism assumes an algebra of propositions, and defines a probability function on this algebra, which is interpreted as a credence, or degree of belief, function. Intuitively, this function represents how confident an agent is in the truth of any given proposition. Bayesianism has many applications, the most prominent of which being decision theory, which is the study of how rational agents do or ought to act. There is a vast literature on Bayesianism. Some prominent problems include: whether degrees of belief should be represented by a single real number, whether agents should update their degrees of belief in the light of evidence via conditionalisation, and what degrees of belief agents should have in chancy propositions. All these problems assume an underlying algebra of propositions. In my research, I investigate this underlying algebra.

Many critics of Bayesianism argue against it on the grounds that there are some important aspects of rationality that cannot be captured in the Bayesian framework. This includes, for instance, widely discussed themes such as theory change in science (a Kuhnian theme) or the intensionality of belief (a Fregean theme). The main goal of the thesis is to argue that, understood in its full generality (that is, not just considering credence functions but also the algebras on which these functions are defined), Bayesianism actually does have the resources to formulate these problems, and more. The two upshots of the thesis then are intended to be: on the one hand, a novel insight into these classic problems, and on the other hand, a defense of Bayesianism as a model of rationality.

Let me say a bit more about these two things. First, new insights into classic problems. Nowhere will I claim that Bayesianism alone can solve any of these problems. After all, it is simply a thesis about how epistemic and doxastic states should be represented, together with some (very) weak constraints on how these epistemic and doxastic states should evolve in response to new evidence. I will claim, however, that the Bayesian framework is adequate for the *formulation* of these problems. That is the claim that is being contested by the critics I mention in the previous paragraph, and it is by no means trivial. So, if not solutions to these problems, what kind of insight into them can these Bayesian formulations offer? Mainly, I will argue, they are very helpful in precisely carving out the different possible strategies for responses to these problems. Such characterisations of logical space may prove very useful

in order to understand precisely what the problems are—something that informal approaches sometimes fail to do rigorously. Furthermore, such formulations will be serve to indicate, about some existing response-strategies to these problems, why they are inadequate—why they could not possibly solve the problem at hand. These two points will serve as the basis for my second main aim: to argue that the Bayesian framework is a good one to model rationality. In using it to do these two things mentioned above, I hope to suggest that it is a good tool to use to address classic philosophical problems.

A final goal of the thesis will be to offer some support to the sceptical claim that we are not justified in believing anything about the unobserved, ever. This theme will be explored throughout the entire thesis, and although it will never be explicitly defended, it will be shown to be a natural response to a vast number of problems that we encounter and that we usually do not take to be related to this form of scepticism. Even though I do not hope to convince the (potential) reader of the thesis of this claim, I do intend to convince her that, unless she can provide a satisfactory reason against holding such a claim (I will explain what I take “satisfactory” to mean here), she will struggle to address many more problems than are usually acknowledged.

There are seven chapters planned in the thesis so far. Some may be added and/or deleted from the thesis if the claims I plan to make turn out not to work, or if I have some interesting new ideas that are related to my main goal. So, I conceive of this plan as very much susceptible to modification. The seven chapters concern: Hume’s problem of induction (§1), Kuhn’s problem of theory change (§2), Frege’s problem of the intensionality of propositional attitudes (§3), the problem of the compatibility between free will and determinism (§4), the problem of the compatibility between non-trivial objective probability, credences, and determinism (§5), the problem of how indeterminacy, including vagueness, relates to belief and decision-making (§6), and the problem of how designation relates to belief and decision-making (§7).

**04.06.2017**