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Best System Accounts of Objective Probability

Is there any way of further constraining the notion of objective probability, so as to guarantee that the objective probabilities are well-defined across a large range of cases? In this section I'll tell you about a "best system" account of objective probability, according to which the objective probabilities are the result of striving for an optimal balance of simplicity and strength in our overall theory of the world.

We want our theories to be **strong**; in other words: we want them to provide us with as much information as possible. We also want them to be **simple**; in other words: we want the information to be articulated briefly and systematically. A theory that consisted of a huge list detailing what happens at every corner of the universe at every time would be extraordinarily strong, but it wouldn't be simple. In contrast, a theory whose only principle was "2 + 2 = 4" would be extraordinarily simple, but wouldn't be very strong. Good theories strike a balance between simplicity and strength. They allow us to derive a lot of information from simple principles.

The notion of objective probability might be used to help achieve such a balance. Suppose, for example, that someone flips a coin and that we want to predict the outcome. We could try to come up with a definite prediction by using classical mechanics. In order to do so, we would need precise measurements of all forces acting on the coin, and we would need to perform a complex calculation. Although it is in principle possible to do so, it would be exceedingly difficult in practice.

An alternative is to use a probabilistic theory, which states that the objective probability that the coin lands Heads is 50%. Such a theory is not particularly strong. But it is simple enough to be put into practice without specialized measuring equipment or sophisticated computational capabilities. Because a probabilistic theory does not tell us conclusively how the coin will land, it is of limited utility. But it is certainly not useless. It can be used to conclude, for example, that it would be a good idea to accept a bet whereby you win two dollars if the coin lands Heads and lose one dollar if the coin lands Tails. And it might give you enough information to set up a successful casino.

How could one determine if a probabilistic theory is accurate? Suppose someone flips a coin 100,000 times, and gets Heads 31% of the time. This would extremely unlikely to happen if the probability of Heads were 50%. So there are good reasons to reject a probabilistic theory according to which the coin has a 50% chance of landing Heads. If, on the other hand, we observed that 50.023% of the coin landed Heads, we would have little reason to doubt the accuracy of the theory.

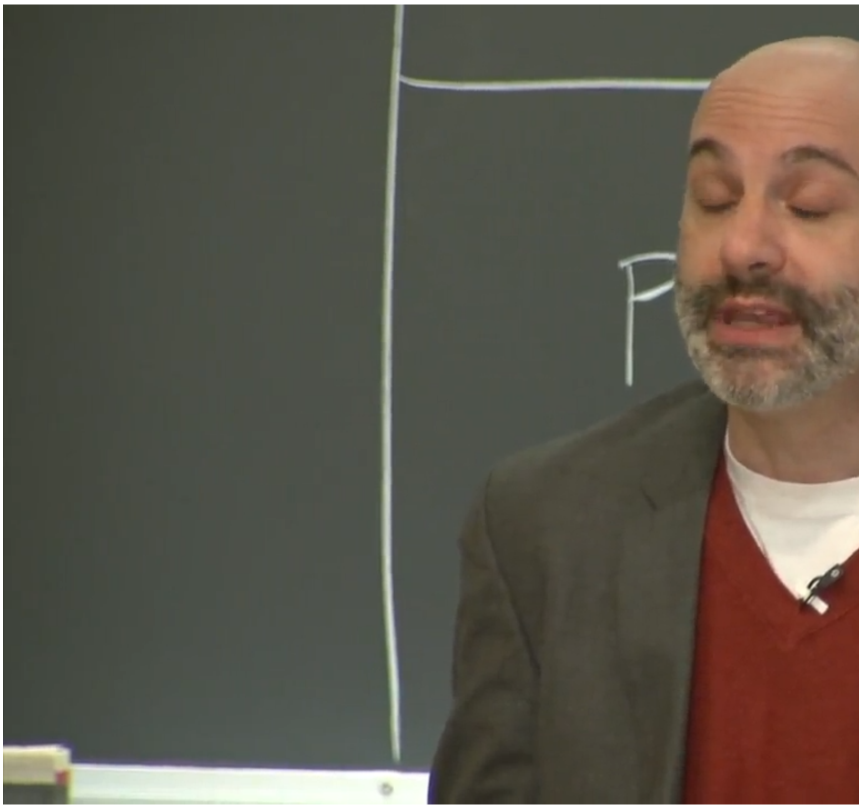
Say that a **best system** for a particular phenomenon is a description of the phenomenon that satisfies two conditions: (1) the description is accurate (i.e. its non-probabilistic claims are all true, and its probabilistic claims are reasonably close to the observed frequencies), and (2) the description delivers an optimal combination of simplicity and strength. (Just what "optimal" means in this context is something that needs to be spelled out.)

Philosopher David Lewis, who we have encountered before, famously argued that the notion of a best system is key to understanding the notion of objective probability. He thought, for example, that all it takes for the objective probability of a quantum event to be x is for our best theory of quantum phenomena to tell us that the objective probability of the event is x. In general, he thought that what it is for the objective probability of event E to be x is simply for the best system for the relevant phenomenon to tell us that the objective probability of E is x.

Is this story plausible as an account of objective probability? The answer depends, in part, on whether one thinks that there are objective standards for counting a theory as an optimal combination of simplicity and strength. Lewis himself believed that there were objective standards of simplicity. On this view, there is no conflict between a best system account of objective probability and the claim that objective probabilities are independent of our psychologies. There's also no conflict with rationalism, since one could claim that rationality demands that one's credences be fixed in accordance with the system that is objectively best.

There is, however, room for disagreeing with Lewis about whether there really is such a thing as objective simplicity (or, indeed, or an objective fact of the matter about what counts as an "optimal" combination of simplicity and strength). My own view is that simplicity is in the eye of the beholder: what counts as simple for humans is may not count as simple for, e.g. Martians. If this is right, then the best system account of probability fails to deliver a notion of probability that is independent of our psychologies. What it delivers instead is a notion of probability that is partly about objective features of the world and partly about our subjective standards for representing the world in ways that we find simple. (There is a lot more to be said about the best-system account of objective probabilities. If you'd like to know more, have a look at the readings I suggest in Section 6.6.)

Video Review: Simplicity and Strength



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So here's a way of getting a handle on the idea.

So start by thinking not of these weird coin tosses

that I defined using seaborgium, but just an ordinary coin toss.

And assume for simplicity that we live in a Newtonian world.

So suppose that I want to produce

a theory that will describe the behavior of coin tosses.

So one kind of theory I could produce

would be a theory that just gives

a very long list of the outcome of various coin tosses.

It goes without saying that it would

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Coin toss probability = 50%

discussion posted 2 days ago by **denisos**

There is a consistent way of interpreting the coin-toss probability of 50% which is slightly different from what the professor explains. Rather than say that the calculation is too complex (which is another way of saying that the objective probability might not be 50%, but we're not able to calculate it), we can say that the probability of any given coin toss landing heads if 50% because of the (random) uncertainty of the input parameters. This can be interpreted as follows:

1. If I know absolutely everything, from your physical strength, the speed of your thumb, the air-flow, every tiny detail of the surfaces, etc., then maybe I can accurately predict, using Newtonian and quantum mechanics (as needed) the exact probability. And it may not be exactly 50%.
2. However, I am 100% confident that there is no way you are able to control most of those parameters sufficiently well to influence the likely outcome, and so in a meaningful sense, the probability that you will get heads when you toss a coin is exactly 50%. And this is the objective probability.

The way the professor describes it, I think the simplicity argument gives us a very meaningful argument for subjective probability, not objective probability.

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