Phil/LPS 31 Introduction to Inductive Logic
Lecture 14

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Topics

- Recap: Is inductive logic possible?
- Introduction to Decision Theory
- Utilities and Losses
- Expected Utility and Risk
- Principles of Rational Choice

Recap: Is inductive logic possible?

Here's Hume (1748) *An Enquiry Concerning Human Understanding*:

> *In vain do you pretend to have learned the nature of bodies from your past experience. Their secret nature, and consequently all their effects and influence, may change without any change in their sensible qualities. This happens sometimes, and with regard to some objects: why may it not happen always, and with regard to all objects? What logic, what process or argument secures you against this supposition? My practice, you say, refutes my doubts. But you mistake the purport of my question. As an agent, I am quite satisfied in the point; but as a philosopher...I want to learn the foundation of this inference.*

Recap: Is inductive logic possible?

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- In the case of deductive logic, the justification of the rules of inference there was that the good rules of inference are precisely those rules of inference that are truth-preserving. But we have seen that these rules are truth-preserving because they are non-ampliative.
- Do we have a similar criterion for selecting the inductive rules of inference that are good? In other words, is inductive logic possible?

Is probability the very guide of life?

> *But to us, probability is the very guide of life.*

Joseph Butler (1736) *The Analogy of Religion, Natural and Revealed, to the Constitution and Course of Nature*

Is probability the true logic for this world?

> *They say that Understanding ought to work by the rules of right reason. These rules are, or ought to be, contained in Logic; but the actual science of Logic is conversant at present only with things either certain, impossible, or entirely doubtful, none of which (fortunately) we have to reason on. Therefore the the True Logic for this world is the Calculus of Probabilities, which takes account of the magnitude of the probability (which is, or which ought to be in a reasonable man's mind). This branch of Math., which is generally thought to favor gambling, dicing, and wagering, and therefore highly immoral, is the only "Mathematics for Practical [People]', as we ought to be.*

James Clerk Maxwell's Letter to Lewis Campbell, c. July 1850

Introduction to Decision Theory

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- Such a characterization will give us a precise of way of saying what we mean when we say that good rules of inductive inference are those rules that lead to "favorable consequences most of the time."
- The way we do this is by merging: (1) probability theory (which gives us the "most of the time part" using expected value) and (2) decision theory (which gives principles we can use to "evaluate consequences", namely the concepts of utility and loss).

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  The probability of any event is the ratio between the value at which an expectation depending on the happening of the event ought to be computed, and the chance of the thing expected upon it's happening.

Introduction to Decision Theory

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- This is quite remarkable! It means that you can: (1) use the expected value of the losses/gains on your decisions to calibrate your probabilities; and (2) you can use probabilities to decide upon which actions are "rational" to take based on their expected losses (risks) or expected gains.

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- Let us see how we can do this more formally.

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