Rational Choice *The (ommitments of Rational (hoice*

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A Biased Coin?

Suppose yesterday (time t_0), you believed that there was a very tiny chance that a new coin is biased to always land heads up (let P(C = B) = 0.001).

This morning (time t_1), you flipped the coin 15 times, and it came up heads every single time (L = 15H).

Right now (time t_2), I offer you the following bet: if the coin is biased, I'll give you QR 100, but if it is not biased, you give me QR 100. Is this bet fair or even favorable?

Most accounts of rationality (especially Bayesianism) would say to update your belief about the coin, in light of the evidence, according to Bayes' theorem: $P(B \mid A) = \frac{P(B) \times P(A \mid B)}{[P(B) \times P(A \mid B)] + [P(\overline{B}) \times P(A \mid \overline{B})]}.$ So in this case, we need to calculate the following: $P(C = B \mid L = I 5H) = \frac{P(C = B) \times P(L = I5H \mid C = B)}{[P(C = B) \times P(L = I5H \mid C = B)] + [P(C \neq B) \times P(L = I5H \mid C \neq B)]}.$

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» A Biased Coin?

To do this calculation, we need the following:

$$\begin{split} P(C = B) &= 0.00 I, \\ P(C \neq B) &= I - P(C = B) = 0.999, \\ P(L = H \mid C = B) &= I, \\ P(L = I_{5}H \mid C = B) &= [P(L = H \mid C = B)]^{15} = (I)^{15} = I, \\ P(L = H \mid C \neq B) &= \frac{1}{2}, \text{and} \\ P(L = I_{5}H \mid C \neq B) &= [P(L = H \mid C \neq B)]^{15} = (\frac{1}{2})^{15} = \frac{1}{2}_{32768}. \end{split}$$



Now we have to put this all together:

$$P(C = B \mid L = 15H) = \frac{P(C = B) \times P(L = 15H \mid C = B)}{[P(C = B) \times P(L = 15H \mid C = B)] + [P(C \neq B) \times P(L = 15H \mid C \neq B)]}$$

$$= \frac{0.001 \times I}{[0.001 \times I] + [0.999 \times (\frac{1}{32668})]}$$

\$\approx 0.970.

So you should definitely accept the bet!

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A Biased Coin

Suppose that yesterday (at time t_0), you were not consciously or explicitly recognizing that it is extremely likely that the coin is biased to always land heads up. Were you irrational?

A Biased Coin

Suppose this ignorance remained this morning (at time t_1), after you flipped the coin fifteen times. Are you irrational then? Why might this expression of ignorance persist after the coin tosses?

A Biased Coin

There are three reasons why at time t_1 , you might not recognize that the coin is extremely likely to be biased:

1. You may not have asked yourself nor been confronted by others with the question of whether the coin is biased. The bet (at time t_2) explicitly raises this question.

2. Under stress, you say it is not biased, and so do not bet.

3. Under stress, you simply plead ignorance. You do not know whether to accept or refuse the bet.

Inquiry and Consistency

These cases illustrate the difference between *inquiry* and *consistency*. In going from yesterday (time t_0) to this morning (time t_{I}), you are performing inquiry, learning about the coin. There is nothing irrational *before* inquiry in not believing the coin is biased. Indeed, your prior probability at that time (P(C=B) =0.001) confirms this.

Inquiry and Consistency

The results of inquiry, however, add commitments of consistency that rational choice theory says you must now satisfy. In the case of the coin, if you are rational then you must be committed to the fact that the coin just came up 15 heads in a row this morning (at time t_{I}). Satisfying this commitment requires consistently updating your beliefs about the coin via Bayes' theorem.

The Demands of Rational Choice

But the norms of rational choice (in this example, updating according to Bayes' theorem) are so demanding! How can I criticize you for failing to live up to them? If you refuse to believe the coin is biased, or refuse to take the bet, doesn't this simply reflect the "bounded" limits of rational choice for human beings?

The Demands of Rational Choice

According to Isaac Levi, the norms of rational choice (whatever they end up being) should always remain in force, even though they may sometimes be difficult or even impossible to satisfy.

To defend this, Levi argues that trying to "tailor our principles of rationality to our capacities to satisfy them . . . will continue until there is nothing of interest left to carve out" (p. 263). Why?

The Demands of Rational Choice

Instead of simplifying the theory of rational choice to fit with "bounded" rationality, as Herbert Simon suggests, Levi maintains that people should "seek therapy" or "devise prostheses" in order to behave more rationally.

Inquiry and Therapy

Levi is sharp to distinguish *therapy* from *inquiry*. Inquiry involves learning more about the world. With the coin, this means to actually flip it. Therapy involves keeping our beliefs, values, and decisions consistent with the results of inquiry; it is about learning how to think. With the coin, you need to familiarize yourself with Bayes' theorem for updating.

The Covenant of Reason

Levi believes we should treat the norms of rationality like *religious vows*. That is, they may be impossible to always satisfy, but they are commitments that we should seek to fulfill as much as our capacities allow. We should not complacently dilute down our commitment to rationality because it may be too hard or difficult to satisfy. Like religious vows, the real debate over the norms of rationality should based on their normative value and not on whether they are too demanding.

The Covenant of Reason

In sum, our covenant with reason is not one of absolute perfection. "God is merciful", but "we are ... obliged to improve our capacities to fulfill our comments" (p. 270). So when our capacities fail, we must seek therapy, prostheses, and even education to help improve them. The real sin is to give up on them and on ourselves.

- The **final exam** will be held in **lecture hall 2163** (note the new room number!) on Monday, April 30th, and begin promptly at 8:30AM. Show up and be seated by that time.
- This exam is open book and open notes, but absolutely no electronic devices are allowed. Plan accordingly.
- I will provide you with two pencils, one pen, a simple calculator, and plenty of scratch paper.