Frequency-type Interpretations of Probability

Frequentism identifies probabilities with frequencies. Very Roughly: the probability that A is B = the proportion of As that are Bs. There are several different ways to cash this idea out:

1. **Actual Finite Frequentism.** The probability of an event = its actual relative frequency.

   **Finite Frequentism:** The probability of an attribute A in a finite reference class B is the relative frequency of actual occurrences of A within B.

   **Example:** I have an urn containing 100 marbles. Exactly 12 of the marbles are red. You reach in and grab a marble. What is the probability that the marble you’ve selected is red? **Answer:** There are 12 red marbles, and 100 marbles total; so = \( \frac{12}{100} \).

   **Hajek’s Fifteen Arguments Against Actual Finite Frequentism:**
   

   **Main Problem:** It seems to get the wrong results. Suppose a fair coin is flipped once. It comes up heads. The coin is never flipped again. Is the probability of heads = 1, or = \( \frac{1}{2} \)?

2. **Hypothetical Frequentism.** The probability of an event = proportion of times it would occur out of an infinite number of trials.

   **Hypothetical Frequentism:** The probability of an attribute A in a reference class B = p if and only if the limit of the relative frequency of occurrences of A within B would be p if B were infinite.

   **Hajek’s Fifteen Arguments Against Actual Finite Frequentism:**


Major Problem: What counts as the "same trial"? Events that, intuitively, cannot be repeated have probabilities. Who cares about what happens in the long run?

3. **Propensity.** The probability of an event occurring = the propensity (or disposition, or tendency, etc.) of the world to produce events of that type. Objects have dispositional properties which ground facts about hypothetical frequencies.

**Belief-type Interpretations of Probability**

1. **The Evidential/Logical Interpretation.** We understand probability as a generalization of the notion of deductive entailment. Probability captures the idea that *A strongly supports B*, without *entailing* it.

2. **The Personal Probability Interpretation.** There are two types:
   - Actual Personal Probabilities.
   - Ideally Rational Personal Probabilities.

**The Bayesian Program:**

**Stage 1**: **Precision.** Individuals have real-valued degrees of belief.

**Stage 2**: **Synchronic Rationality (Probabilism).** A rational agent’s degrees of belief conform to the probability axioms.

**Stage 3**: **Diachronic Rationality (Conditionalization).** The rational way to "update" on some information is to conditionalize on it.

Probability is degree of belief.