

Conditional Probability: Fundamentals: Takeaways

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Concepts

- The probability of an event A can be updated based on information of about . the occurrence of another event. The probability that A occurs *given* that B occurs is denoted as $P(A|B)$ and is called the **conditional probability** of A given that condition that B occurs.
- Conditioning on an event typically reduces the size, or **cardinality**, of the sample space.
- We can calculate $P(A|B)$ using a formula written in terms of set cardinalities:

$$P(A|B) = \frac{\text{card}(A \cap B)}{\text{card}(B)}$$

- Another way to calculate $P(A|B)$ consists of using a formula written in terms of probabilities:

$$P(A|B) = \frac{P(A \cap B)}{P(B)}$$

- Both of the above formulas lead to the same result. One is in terms of cardinalities, while the other is in terms of probabilities.
- The two conditional probabilities $P(A|B)$ and $P(B|A)$ are more likely than not to **not be the same**. Often, they will have distinct meanings that important for different audiences, as seen in the example of the doctor versus the patient in HIV testing.

Resources

- [An easy intro to some basic conditional probability concepts](#)
- [A more technical convey of conditional probability](#)