

Using Bayes' Theorem to predict the probability of a successful challenge of a Defensive Foul call in the NBA requires knowing (1) the overall success rate of challenges to a call, (2) the number of challenges of this type of call, and (3) the success rate of these types of challenges. Using the Baye's Theorem formula, we can determine the probability of a successful challenge.

Bayes' Theorem formula is:

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

For Defensive Fouls during the NBA 2023 – 2024 season:

- The overall success rate was 61% or  $P(A) = 0.61$
- The number of “Defensive Foul” challenges was 57% or  $P(B) = 0.57$
- The success rate of challenges for Defensive Foul was 55%.

### Applying the Values

Using the given values:

$$P(A|B) = \frac{0.55 \cdot 0.61}{0.57}$$

### Calculation

Let's calculate it step-by-step:

1. Calculate the numerator:

$$P(B|A) \cdot P(A) = 0.55 \cdot 0.61 = 0.3355$$

2. Divide by the denominator  $P(B)$ :

$$P(A|B) = \frac{0.3355}{0.57}$$

3. Perform the division:

$$P(A|B) = 0.5886$$

So, the probability of a successful challenge of a Defensive Foul call, given the statistics provided, is approximately 0.5890.5890.589 or 58.9%.