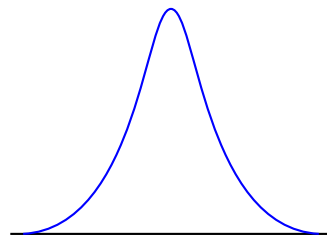


The Shape of Variability: Skew

When we look at a histogram, we are looking for the “story” of the population. While we often look for the peak (the mode), the *shape* of the distribution tells us how the data is spread out across the range.

1. Symmetry: The Baseline

A distribution is called **Symmetric** if the right side is a mirror image of the left side.



Symmetric (Bell-Shaped)

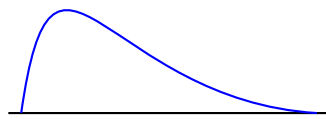
Sally the Statypus says: In a perfectly symmetric distribution, if you folded the graph in half vertically at the peak, the two sides would overlap exactly. This is rare in biology, but it is our starting point!

2. Identifying the Direction of Skew

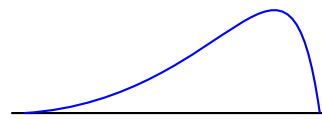
Statypus Insight: Understanding Skewness

Skewness is a measure of asymmetry. We name the skew based on the direction of the long, thin tail:

- **Skewed Right (Positive):** The tail stretches toward the larger values on the right.
- **Skewed Left (Negative):** The tail stretches toward the smaller values on the left.



Skewed Right



Skewed Left

Seneca the Statypus: The Architecture of the Lean



Symmetry is the architecture of balance. It is a pillar where the peak holds the center. But Skewness is the architecture of the *lean*. When you see a long tail, you aren’t just looking at “less data.” You are looking at the structural momentum that drags the center of gravity away from the peak.

3. Predicting the Shape

Which direction would the “tail” likely drag for these scenarios? Read through Section 3.4 of r.statypus.org to help you answer the following questions.

Scenario A: Professional Athlete Salaries

Most players earn a league minimum, but a few superstars earn \$50,000,000.

- a. Expected Skew:

- b. Make a rough sketch:

Scenario B: Scores on a Very Easy Test

Imagine a test where the material was so simple that almost everyone scored between 90 and 100, but two students were absent for the lectures and scored a 20 and a 30.

- a. Expected Skew:

- b. Make a rough sketch:

4. Research Synthesis

Replication Report: Distribution Shape

1. **Modality:** If a histogram of platypus weights shows two distinct “mountains,” what might that suggest about the population you measured?

2. **The Drag:** Why is it dangerous to only report the “most common” value (the peak) if a distribution is heavily skewed?

Bill the Statypus says: If you only follow the peak, you might miss the fact that the whole ecosystem is leaning. Sally says we always need to check where the tail is dragging the story.