The p-value, or probability value, is a measure used in statistical hypothesis testing to determine the strength of evidence against the null hypothesis. It quantifies the likelihood of observing the data or more extreme results if the null hypothesis were true.

Here's a more detailed definition:

* **P-value**: The p-value is a probability that helps us assess the evidence against the null hypothesis. It tells us how likely we are to observe the data, or more extreme results, if the null hypothesis (typically the hypothesis of no effect or no difference) were true.
* **Interpretation**: A small p-value indicates that the observed data is unlikely to have occurred if the null hypothesis were true. In other words, it suggests strong evidence against the null hypothesis.
* **Significance Level**: The p-value is compared to a predetermined significance level, often denoted as α (alpha). Commonly used significance levels include 0.05 (5%) or 0.01 (1%). If the p-value is less than or equal to the significance level, we reject the null hypothesis in favor of an alternative hypothesis.
* **Types of Hypothesis Tests**:
  + In a two-tailed test, where we're interested in detecting any difference (either positive or negative), the p-value represents the probability of observing data as extreme as, or more extreme than, what was observed.
  + In a one-tailed test, where we're specifically interested in one direction of difference (either positive or negative), the p-value represents the probability of observing data as extreme as, or more extreme than, what was observed in that direction.
* **Uncertainty**: It's important to note that a small p-value doesn't necessarily prove that the null hypothesis is false; rather, it indicates that there is strong evidence against it. Additionally, the p-value doesn't provide information about the magnitude or importance of the effect, only its statistical significance.

In summary, the p-value is a crucial concept in statistical inference, helping researchers make decisions about whether to accept or reject the null hypothesis based on the strength of evidence provided by the observed data.