

p-value (P value, p , P)

The *complement* of the *quantile* of a *test statistic*. Given a *test statistic* $T \sim D$ following a *probability distribution* D , the quantile of the statistic would be $Q = F_D(T)$, where F_D is the *cumulative distribution function* (CDF) of D . That is, if the test statistic in a *hypothesis test* translates to an *improbability* of Q , then the corresponding p-value would be $P = 1 - Q$. So a null hypothesis must be rejected at a *level of significance* of α , if Q falls within a *critical region* of the probability α .

The interpretation of the p-value is the *probability* for the observed (\rightarrow *observation*) data to arise by chance while the null hypothesis holds or, in other words, the probability of committing a *type I error*. The p-value is denoted by the symbols p or P , which both have well-known other meanings (\rightarrow *probability*). This may cause some confusion.