Confidence Interval reminder

What is the interpretation of a frequentist confidence interval at a 95% level ?

95% of the intervals computed on all possible samples (all those that could have been observed) contain the true value θ

Warning: one cannot interpret a realization of a confidence interval in probabilistic terms ! It is a common mistake...



The **credibility interval** is interpreted much more naturally than the confidence interval:

It is an interval that has a 95% chance of containing θ (for a 95% level, obviously)

Defined as an interval with a high *posterior* probability of occurrence.

For example, a **95% credibility interval** is an interval $[t_{inf}, t_{sup}]$ such that $\int_{t_{inf}}^{t_{sup}} p(\theta|\mathbf{y}) d\theta = 0.95$

NB: usually interested in the shortest possible 95% credibility interval (also called Highest Density Interval).

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Bayes Factor: marginal likelihood ratio between two hypotheses

 $BF_{10} = \frac{f(\boldsymbol{y}|H_1)}{f(\boldsymbol{y}|H_0)}$

 \Rightarrow favored support for either hypothesis from the observed data y

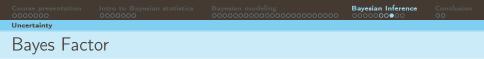


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BF value	Interpretation
<i>BF</i> < 1	Negative (favors H_0)
$1 \leq BF < 10^{1/2}$	Barely worth mentioning
$10^{1/2} \le BF < 10$	Substantial
$10 \le BF < 10^{3/2}$	Strong
$10^{3/2} \le BF < 100$	Very strong
$100 \le BF$	Decisive



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Posterior odds:

$$\frac{p(H_1|\mathbf{y})}{p(H_0|\mathbf{y})} = BF_{10} \times \frac{p(H_1)}{p(H_0)}$$

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