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. . .

Credibility interval

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 $\int_{t_{inf}}^{t_{sup}} p(\theta|\boldsymbol{y})\,\mathrm{d}\theta = 0.95$

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

Bayes Factor

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 $\boldsymbol{y}$

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

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Posterior odds: $$\frac{p(H_1|\boldsymbol{y})}{p(H_0|\boldsymbol{y})} = BF_{10} \times \frac{p(H_1)}{p(H_0)}$$