Confidence Distributions in Meta-Analysis

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Statistical inference

Group	Event	No Event
Treatment	10	42
Control	12	35

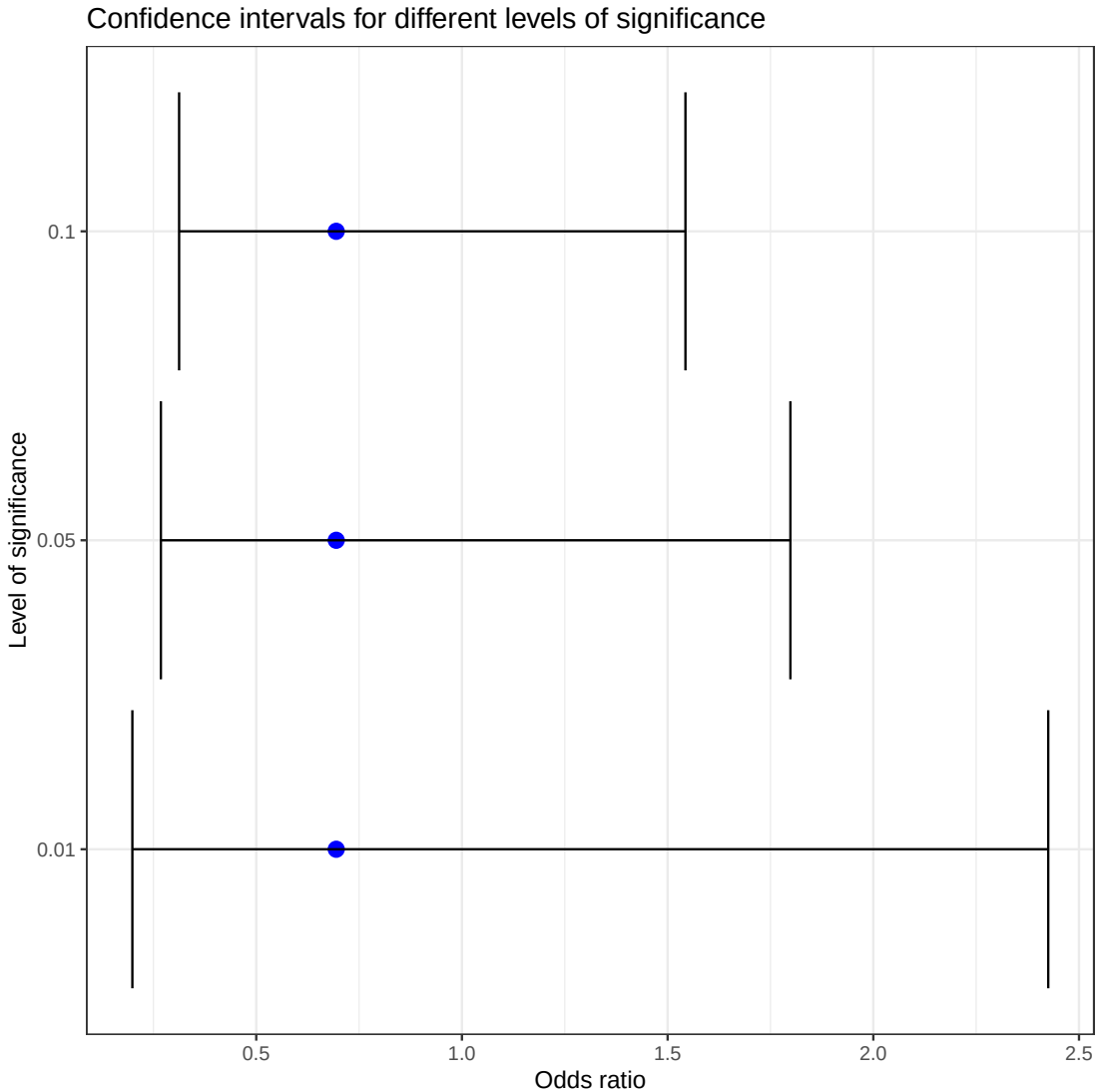
$$\text{Odds Ratio} = \frac{\text{ET}/\text{NT}}{\text{EC}/\text{NC}}$$

$$\hat{\text{OR}} = 0.694,\ \text{P-value} = 0.453,\ 95\%\ \text{CI} = (0.268, 1.80)$$

Statistical inference

- We are interested in θ
- P-values: $P(\text{abs}(T) \geq \text{abs}(t)|\theta = \theta_0)$
- Confidence intervals: $\hat{\theta} \pm z^*(\alpha)\text{SE}(\hat{\theta})$

Statistical Inference

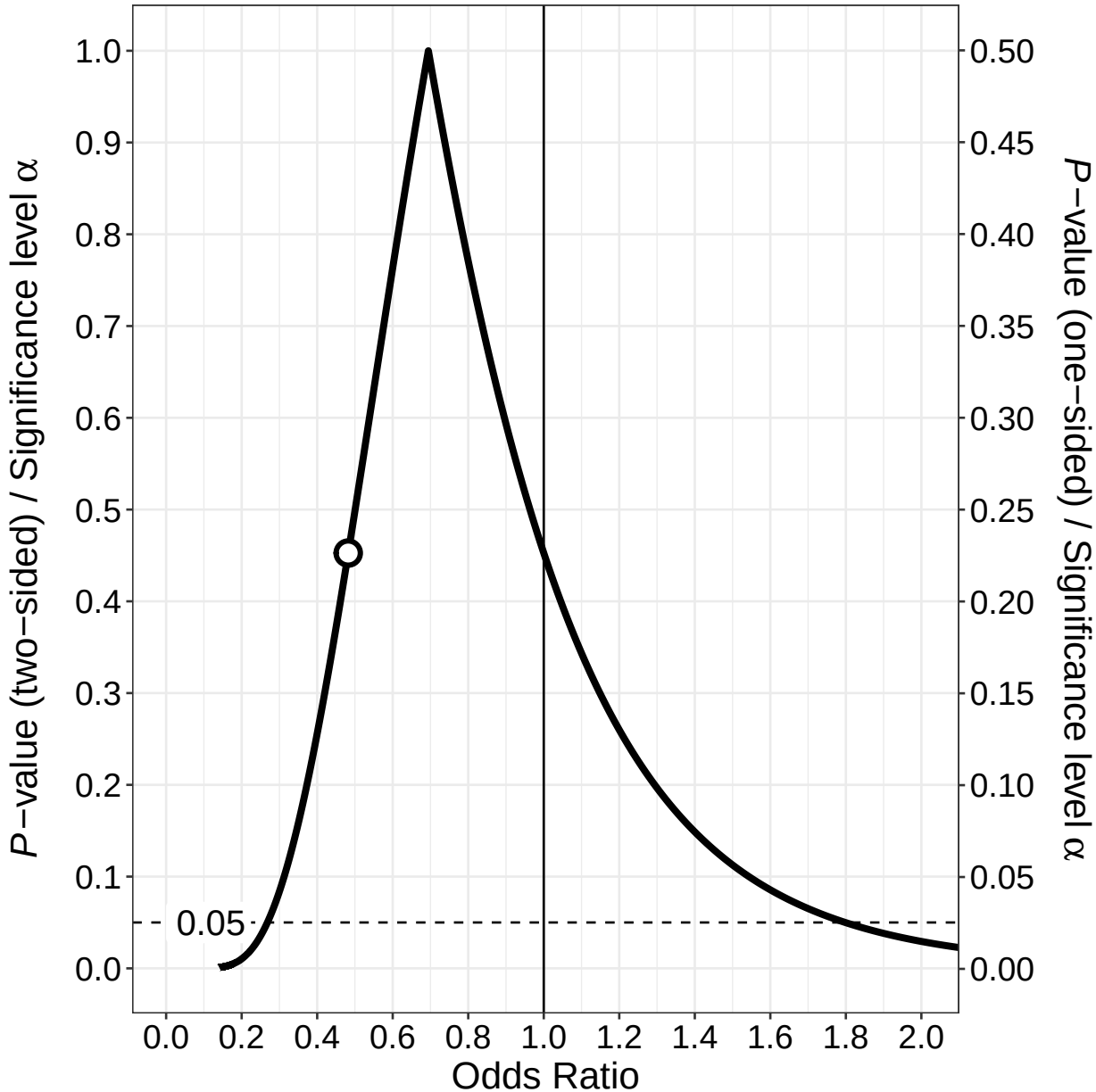


Inference depends on choice of level of significance and null value

P-value functions

- Compute p-values for all levels of significance
- Allows for field experts to make decision

P-value functions



P-value functions

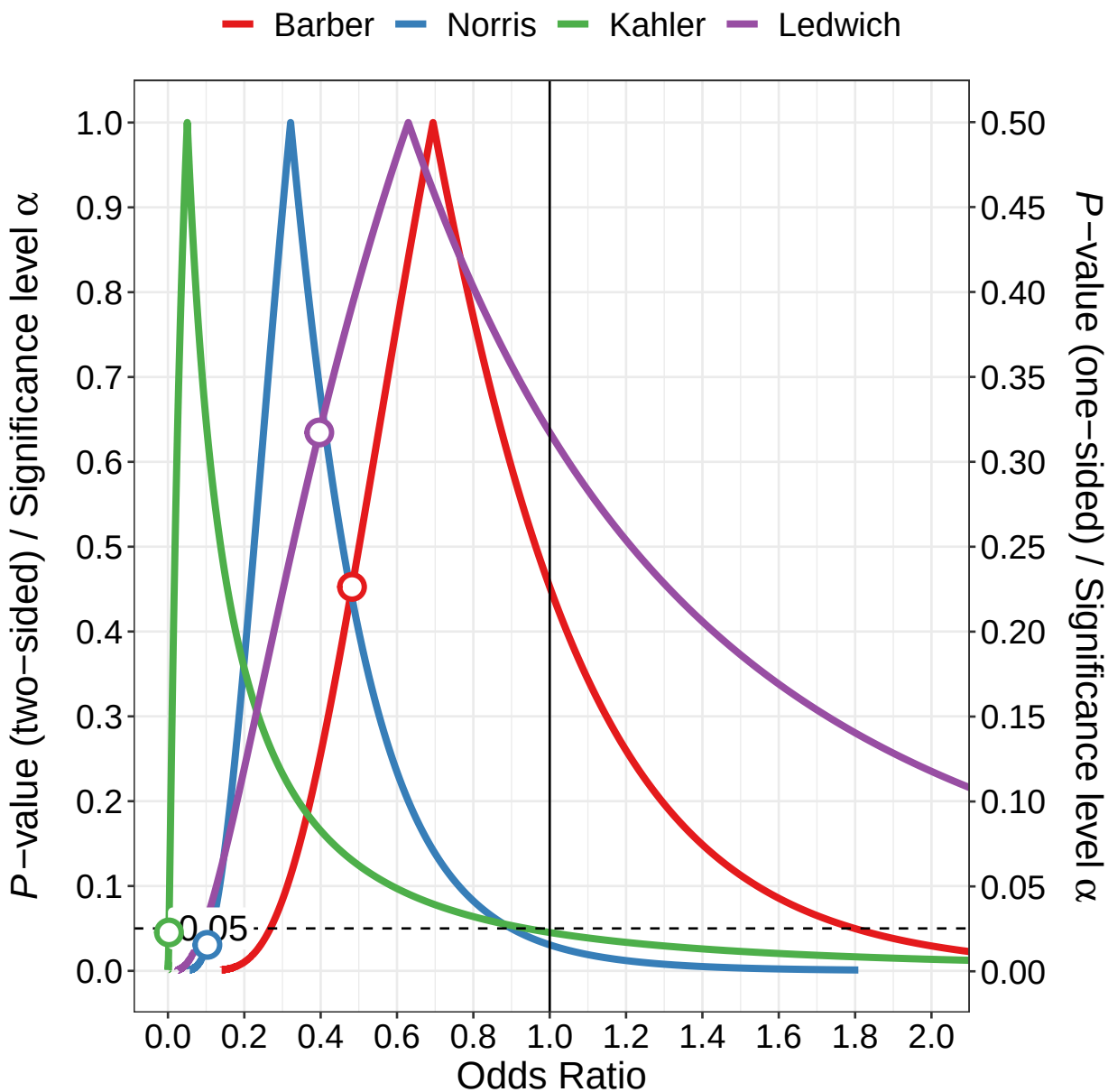
$$\alpha = 2\left(1 - \Phi\left(\frac{|\theta - \hat{\theta}|}{\mathrm{SE}(\hat{\theta})}\right)\right)$$

- α: level of significance
- θ: parameter of interest
- $\hat{\theta}$: estimate of θ
- Φ: standard normal cdf

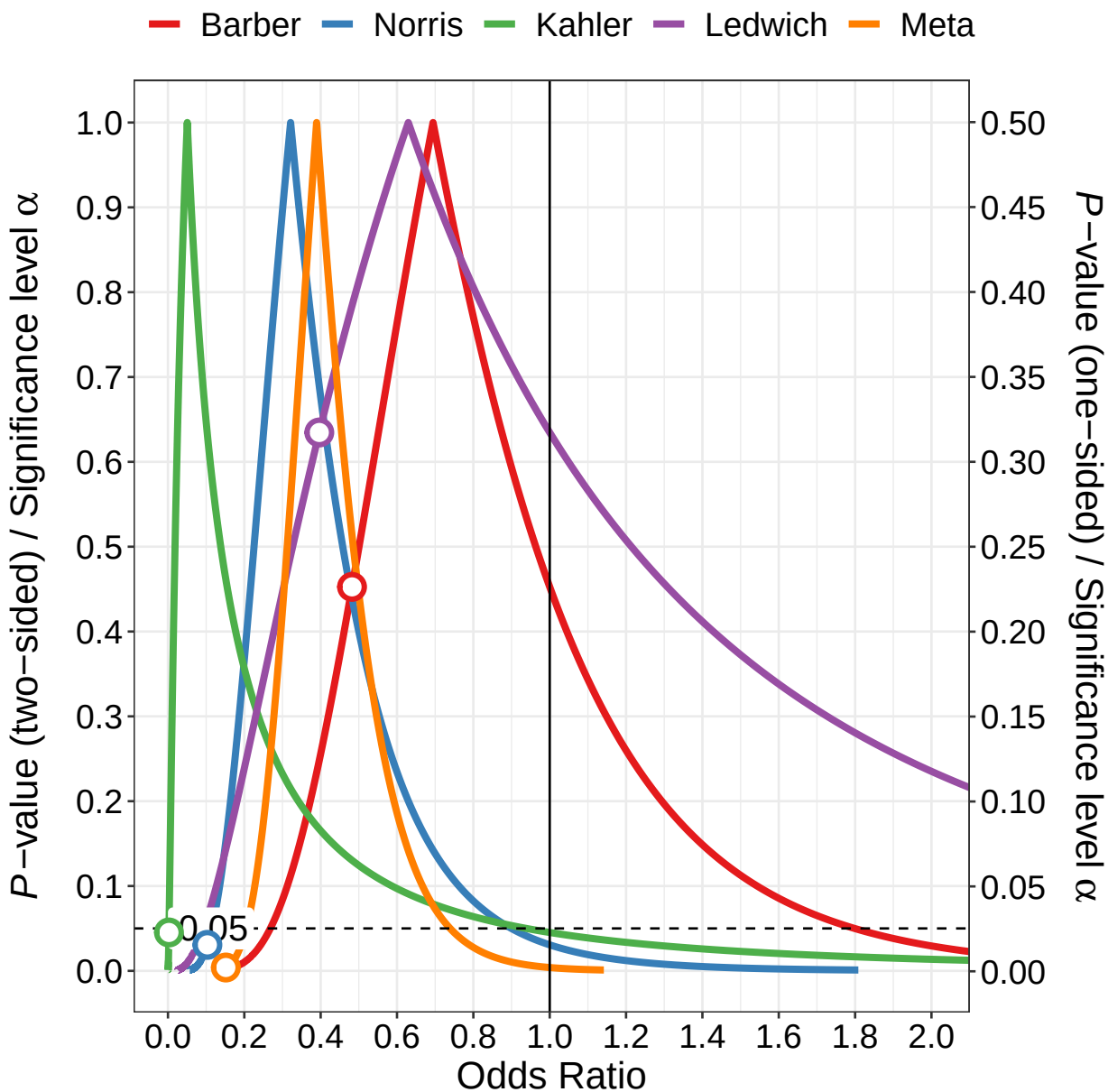
Meta-Analysis

Author	Ee	Ne	Ec	Nc
Barber	10	42	12	35
Norris	5	221	15	213
Kahler	0	38	6	25
Ledwich	2	18	3	17

Meta-Analysis



Meta-Analysis



Meta-Analysis

- In approaches above, normality is assumed
- Goal: create an exact confidence distribution for rare event meta-analyses