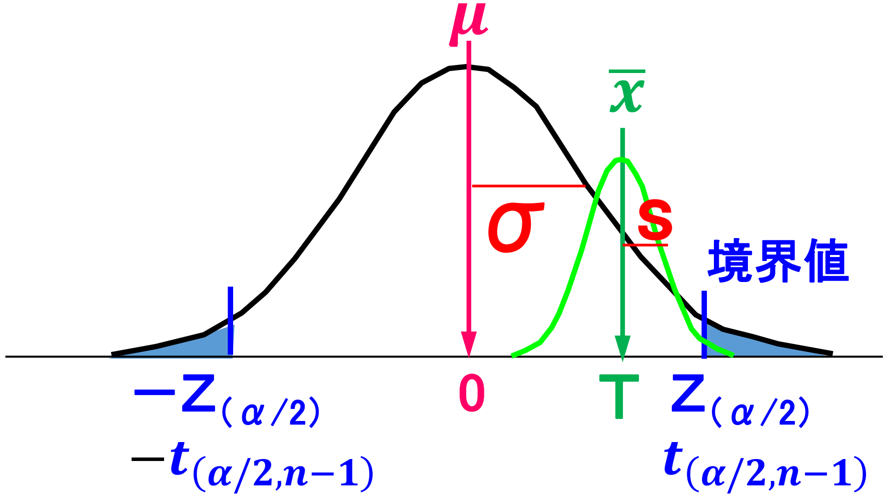
母集団平均値の推定



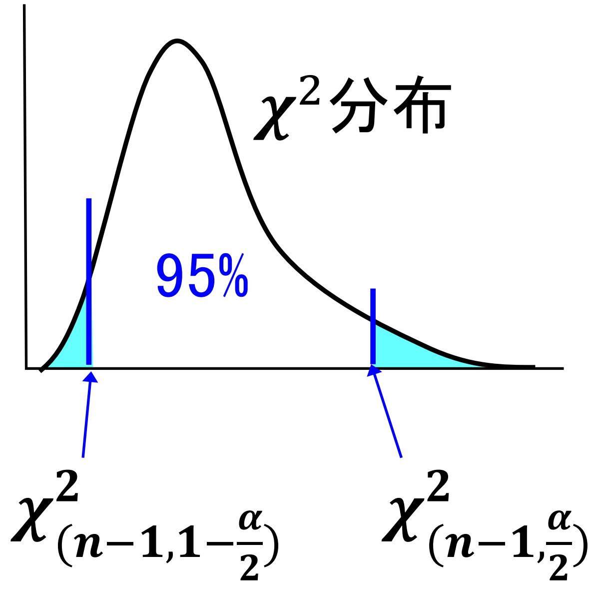
n ≧100　母集団の σ 既知の場合

$$\bar{x} - Z_{(\alpha/2)}\left(\frac{\sigma}{\sqrt{n}}\right) < \mu < \bar{x} + Z_{(\alpha/2)}\left(\frac{\sigma}{\sqrt{n}}\right)$$

n <100　母集団の σ 未知の場合

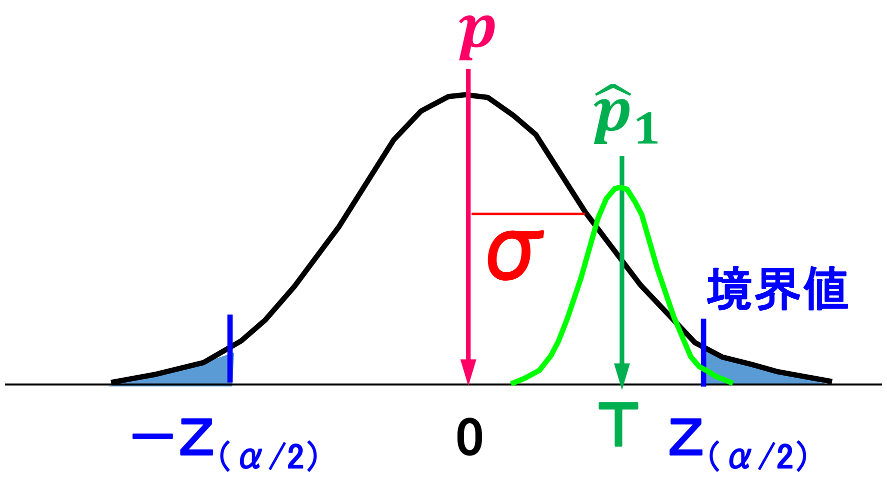
$$\bar{x} - t_{(\alpha/2,n-1)}\left(\frac{s}{\sqrt{n-1}}\right) < \mu < \bar{x} + t_{(\alpha/2,n-1)}\left(\frac{s}{\sqrt{n-1}}\right)$$

母分散の推定



$$\frac{(n-1)s^2}{\chi^2_{(n-1,\frac{\alpha}{2})}} \leq \sigma^2 \leq \frac{(n-1)s^2}{\chi^2_{(n-1,1-\frac{\alpha}{2})}}$$

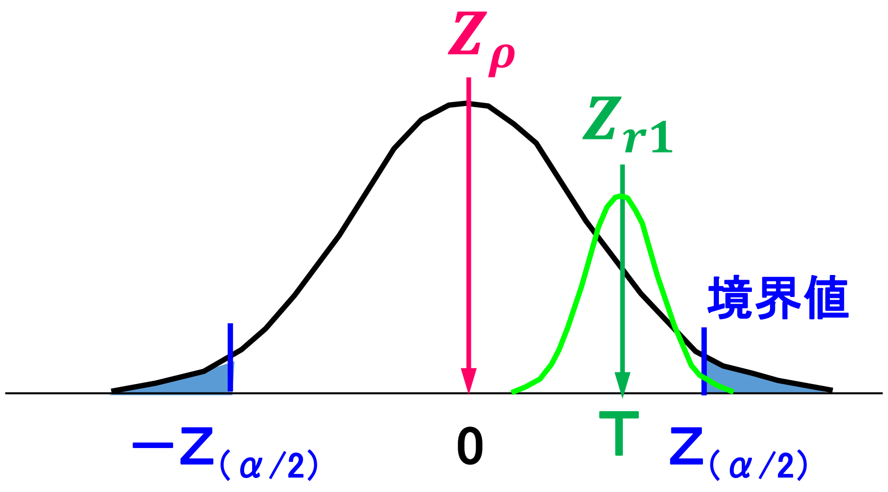
母比率の推定



$$\bar{x} - Z_{(\alpha/2)}\left(\frac{\sigma}{\sqrt{n}}\right) < \mu < \bar{x} + Z_{(\alpha/2)}\left(\frac{\sigma}{\sqrt{n}}\right)$$

$$\hat{p}_1 - Z_{(\alpha/2)}\sqrt{\frac{\hat{p}_1(1-\hat{p}_1)}{n}} < p < \hat{p}_1 + Z_{(\alpha/2)}\sqrt{\frac{\hat{p}_1(1-\hat{p}_1)}{n}}$$

母相関係数ρの推定



Z変換

母相関係数ρ

$$Z_r = \frac{1}{2} ln\left(\frac{1+r}{1-r}\right)$$

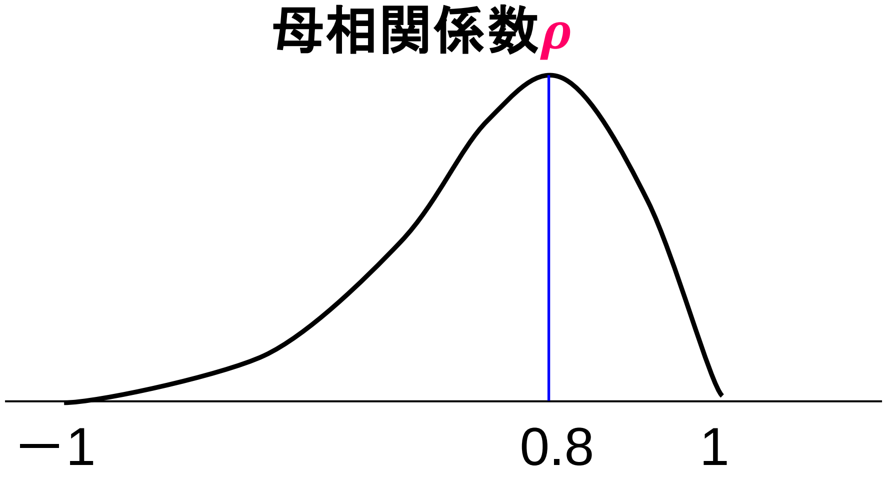
$$\boxed{Z_{r1} - \frac{Z_{(\alpha/2)}}{\sqrt{n-3}}} < Z_\rho < \boxed{Z_{r1} + \frac{Z_{(\alpha/2)}}{\sqrt{n-3}}}$$

$$z^{-1}(x) = \tanh x = \frac{e^x - e^{-x}}{e^x + e^{-x}} = \frac{e^x \cdot e^x - e^{-x} \cdot e^x}{e^x \cdot e^x + e^{-x} \cdot e^x}$$

$$= \frac{e^{2x}-1}{e^{2x}+1}$$

$$\frac{e^{2Z_L} - 1}{e^{2Z_L} + 1} \leq \rho \leq \frac{e^{2Z_U} - 1}{e^{2Z_U} + 1}$$

母相関係数$\rho = 0.8$の時
標本相関係数rの分布



フィッシャーのZ変換

$$Z_r = \frac{1}{2} ln\left(\frac{1+r}{1-r}\right)$$

正規分布に近づける