

# Relationship between Hypothesis Tests and Confidence Intervals

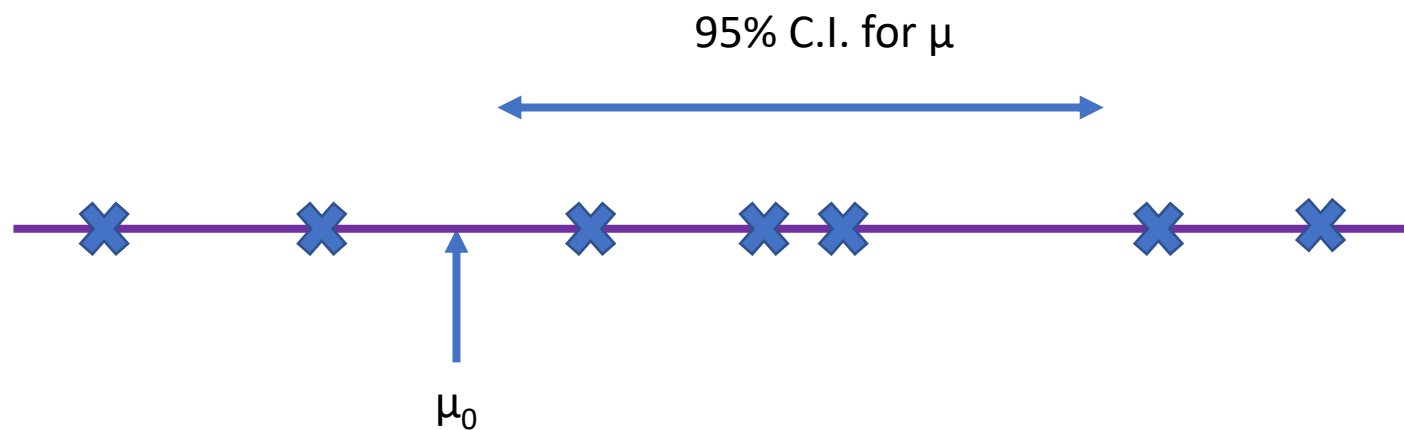
Jian Zhang  
University of Kent

- Consider our usual hypotheses:

$$H_0: \mu = \mu_0$$

$$H_1: \mu \neq \mu_0$$

We will be able to reject the null hypothesis at the 5% significance level if a 95% confidence interval for  $\mu$  excludes  $\mu_0$ :



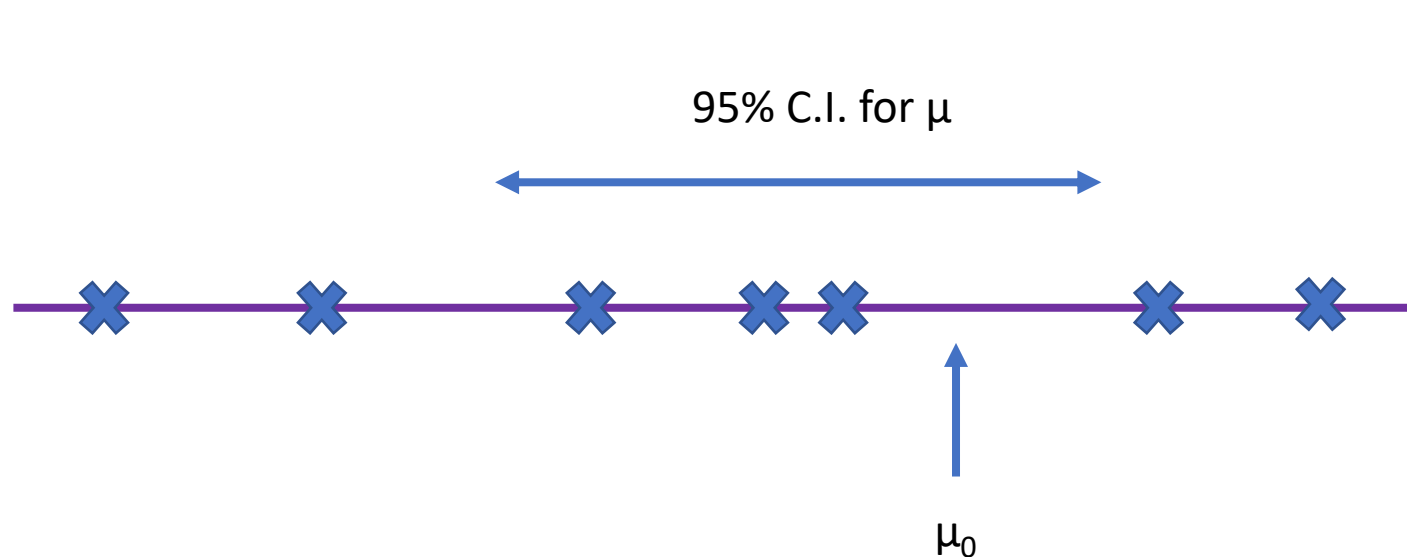
Reject  $H_0$  at the  
5% significance  
level

- Consider our usual hypotheses:

$$H_0: \mu = \mu_0$$

$$H_1: \mu \neq \mu_0$$

If a 95% confidence interval for  $\mu$  includes  $\mu_0$  then we have insufficient evidence to reject the null hypothesis:



Insufficient evidence to reject  $H_0$  at the 5% significance level, meaning that  $\mu_0$  is a plausible value for the population mean.

# General Result

We can reject  $H_0$  at the  $\alpha$  level if and only if a  $100(1-\alpha)\%$  confidence interval for  $\mu$  excludes  $\mu_0$ .

For example, we can reject  $H_0$  at the  $\alpha = 0.01$  level if and only if a 99% confidence interval for  $\mu$  excludes  $\mu_0$ .