DeepLearning.AI

Math for Machine Learning

-

Probability and Statistics - Week 4

W4 Lesson 1

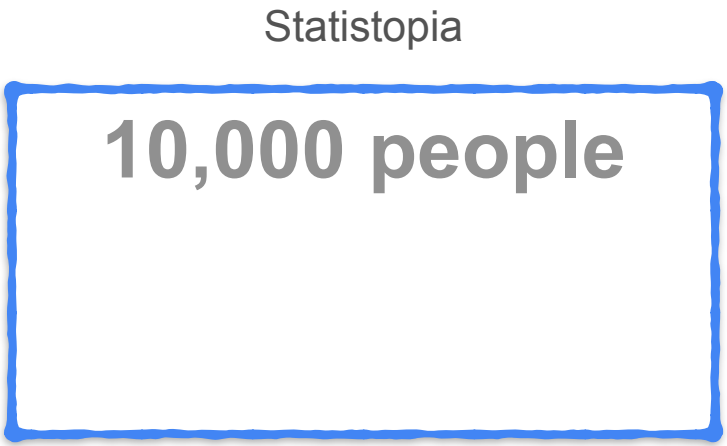
DeepLearning.AI

Confidence Interval

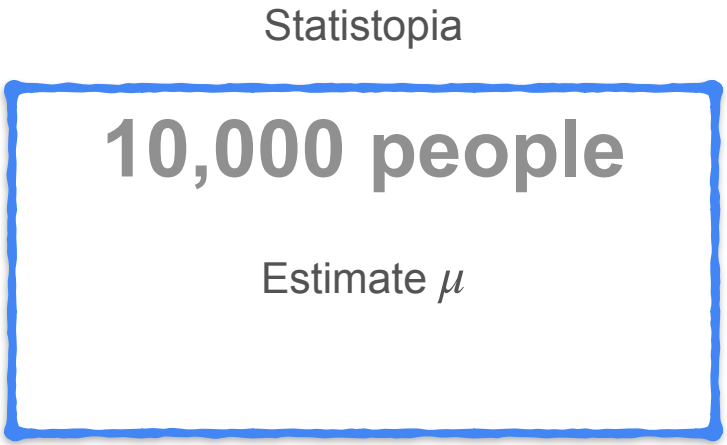
Confidence Interval (Known Standard Deviation)

Confidence Interval - Intuition

Confidence Interval - Intuition



Confidence Interval - Intuition



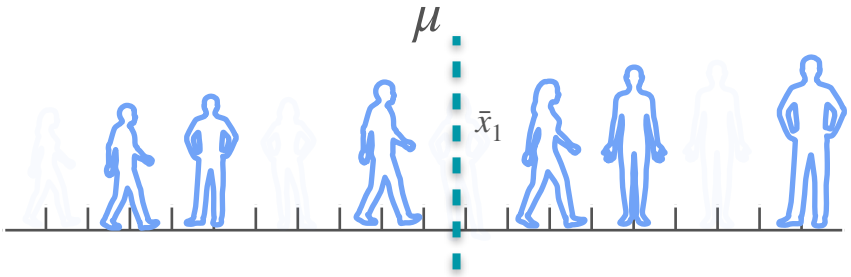
Confidence Interval - Intuition

Statistopia

10,000 people

Estimate μ
(mean height of the population)

Confidence Interval - Intuition



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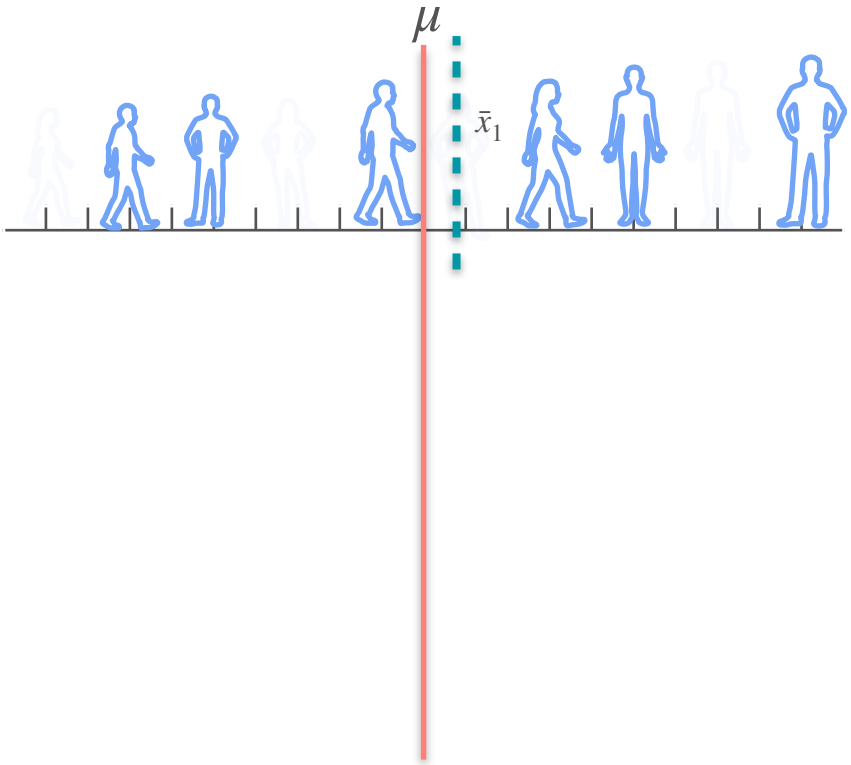

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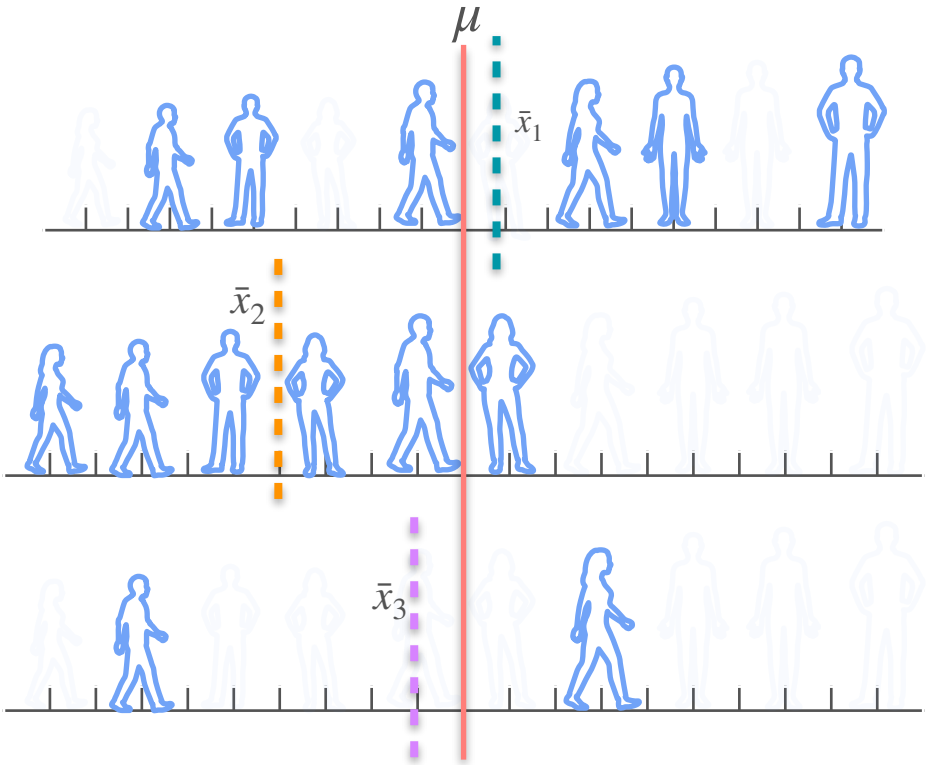

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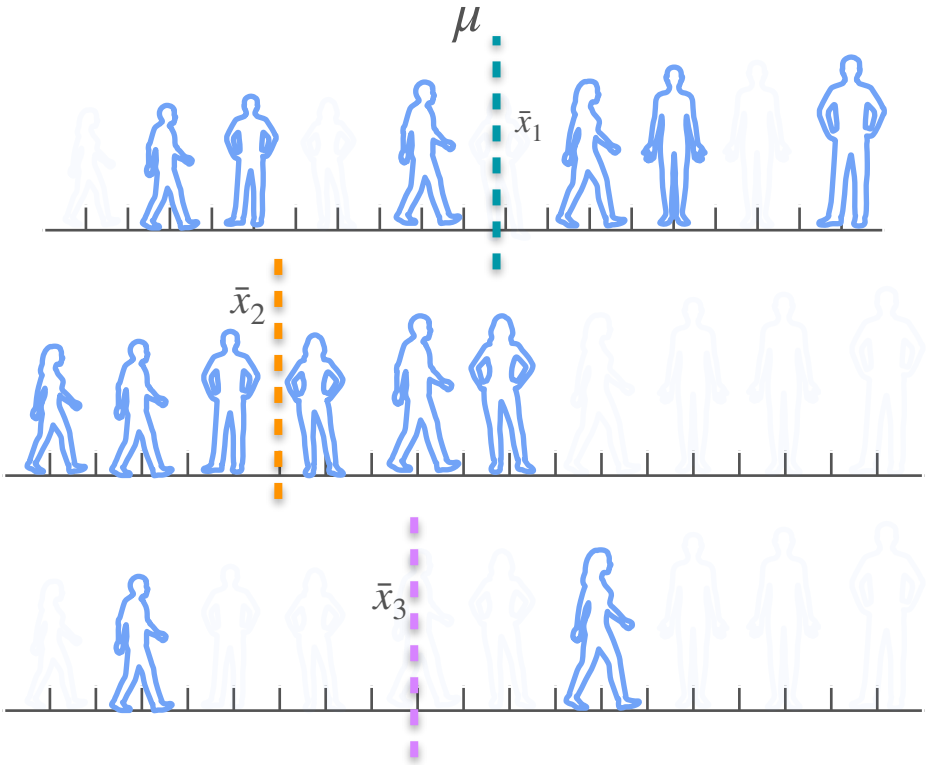

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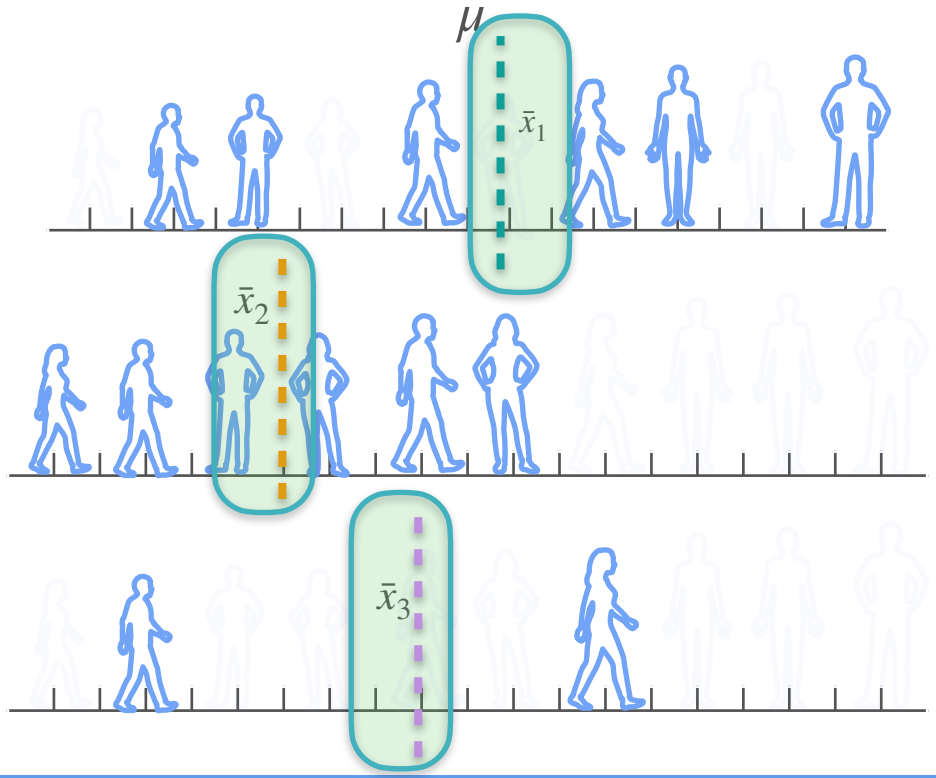


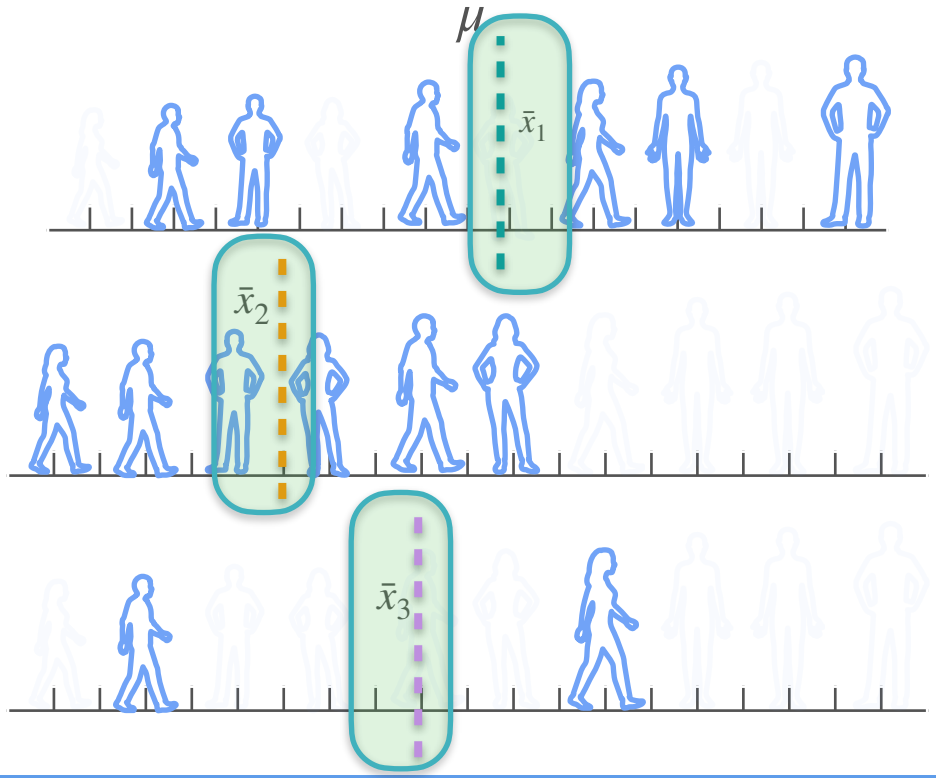
Statistopia

10,000 people

Estimate μ
(mean height of the population)

Can you use these sample means with some degree of certainty?

Confidence Interval - Intuition



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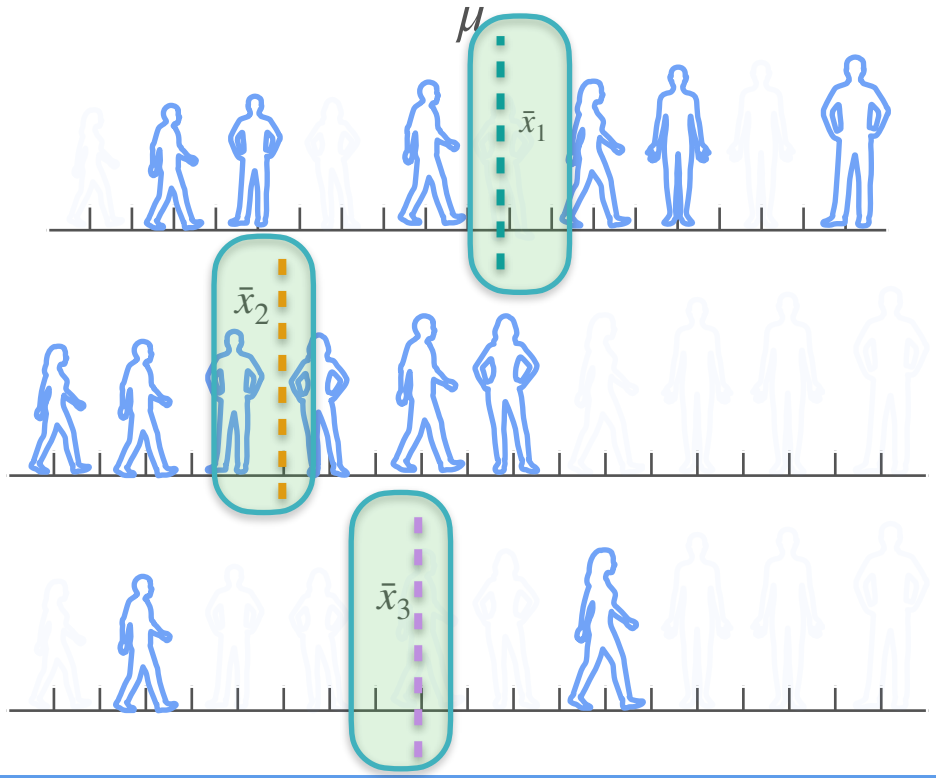

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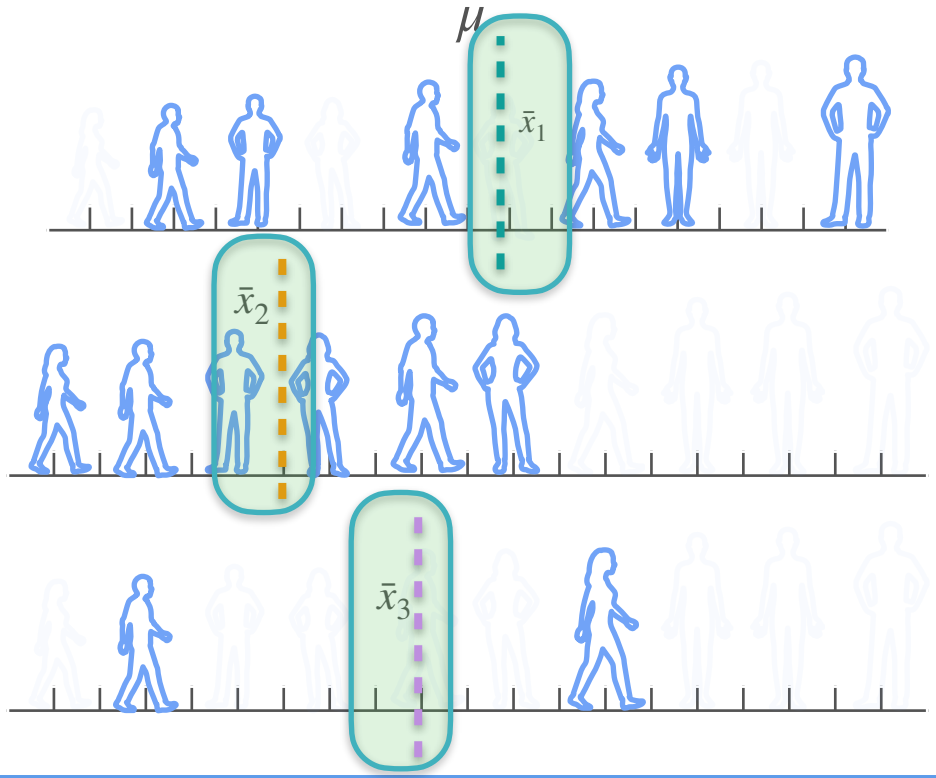

Can you use these sample means with some degree of certainty?

Confidence Interval

lower limit $< \bar{x} <$ upper limit

Confidence Interval - Intuition

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$n = 1$

Confidence Interval - Intuition

$n = 1$

$\bar{x}$

Confidence Interval - Intuition

$n = 1$

$\bar{x}$

Central Limit Theorem

Confidence Interval - Intuition

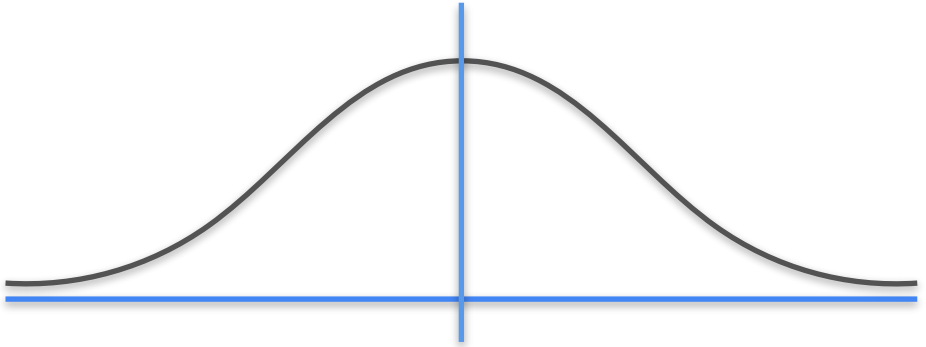
$n = 1$

$\bar{x}$

Central Limit Theorem

population standard deviation (σ)

$\bar{X} \sim \mathcal{N}(\mu, \sigma^2)$



μ

Confidence Interval - Intuition

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$\bar{x}$

Central Limit Theorem

population standard deviation (σ)

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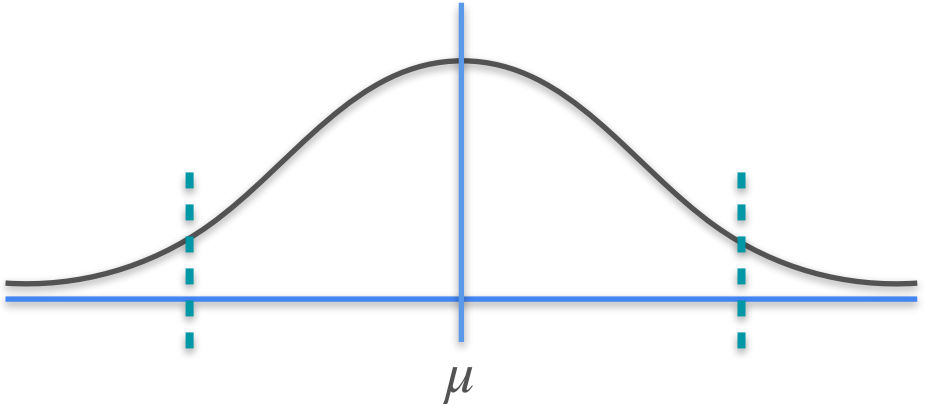

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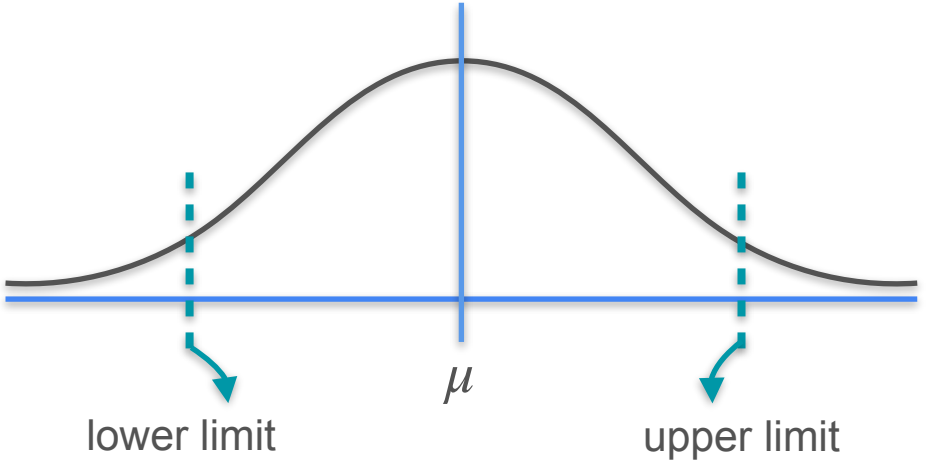

Confidence Interval - Intuition

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%

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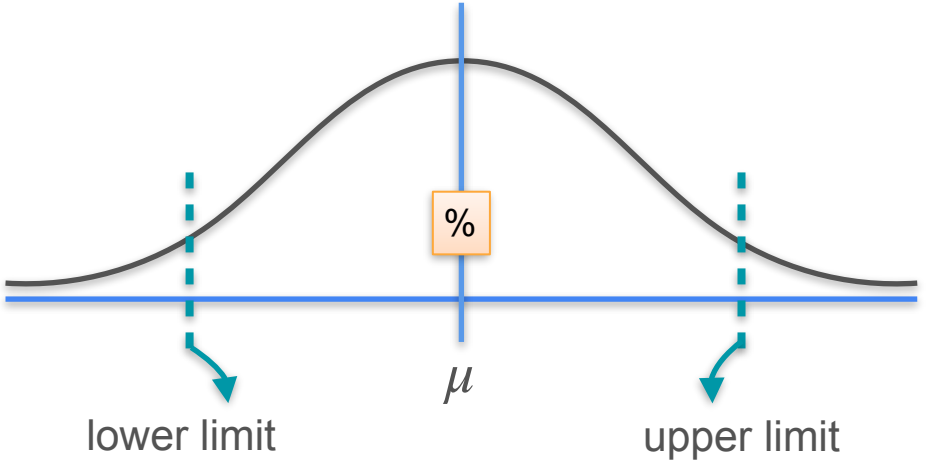

Confidence Interval - Intuition

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%

α

significance level

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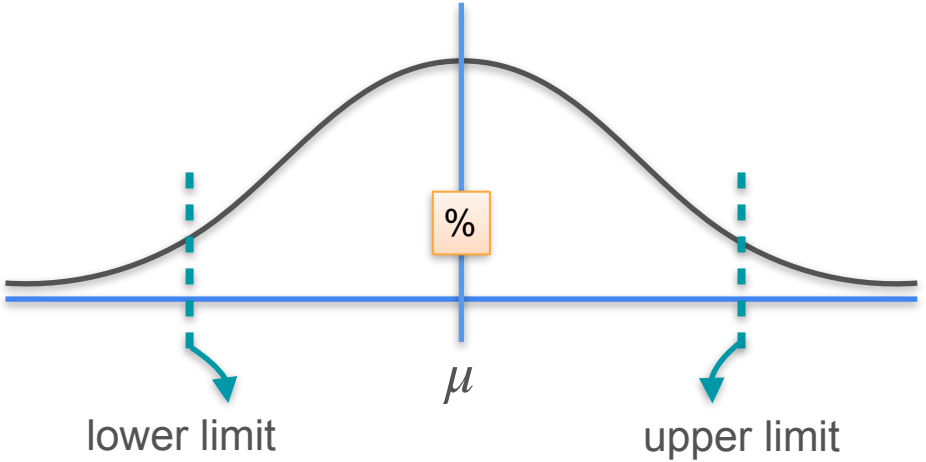

Confidence Interval - Intuition

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%

$1 - \alpha$

α

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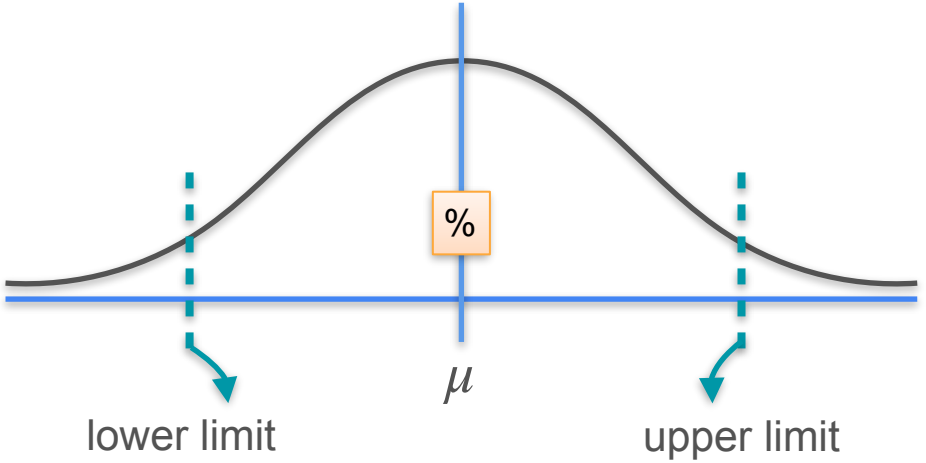

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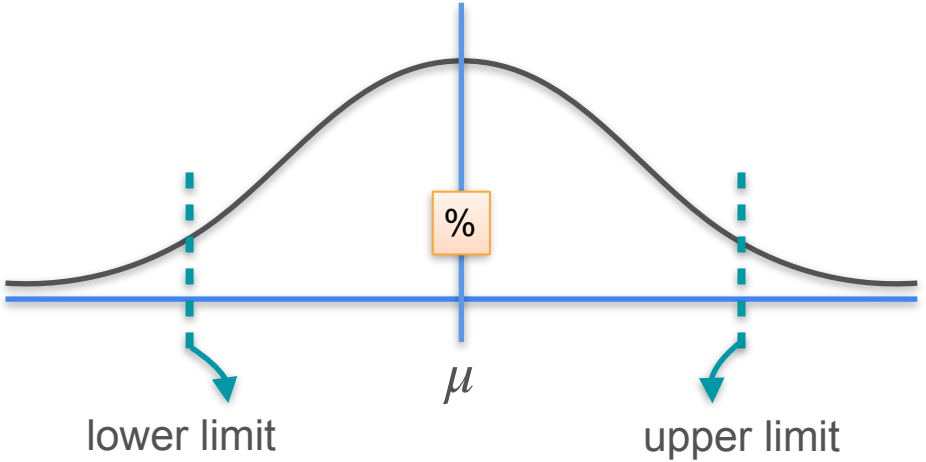

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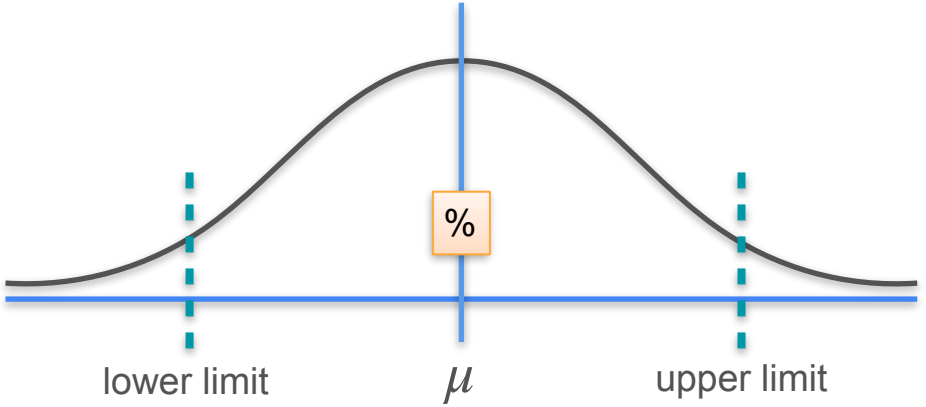

Confidence Interval - Intuition

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Confidence level

%

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$\alpha = 0.05$

significance level

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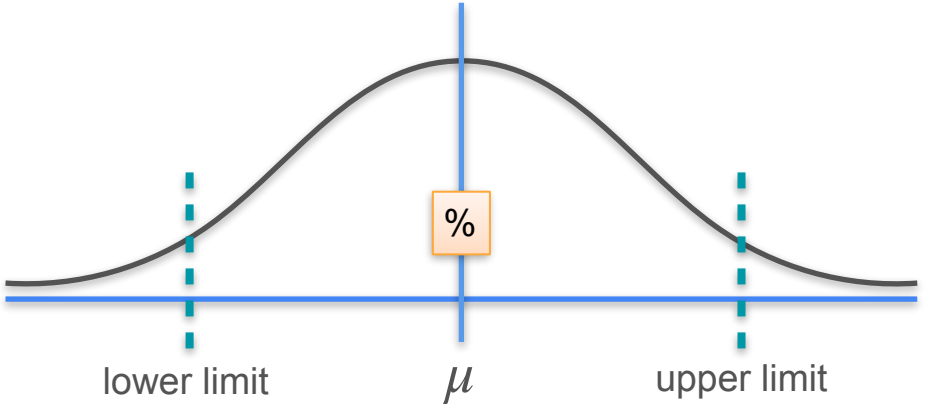

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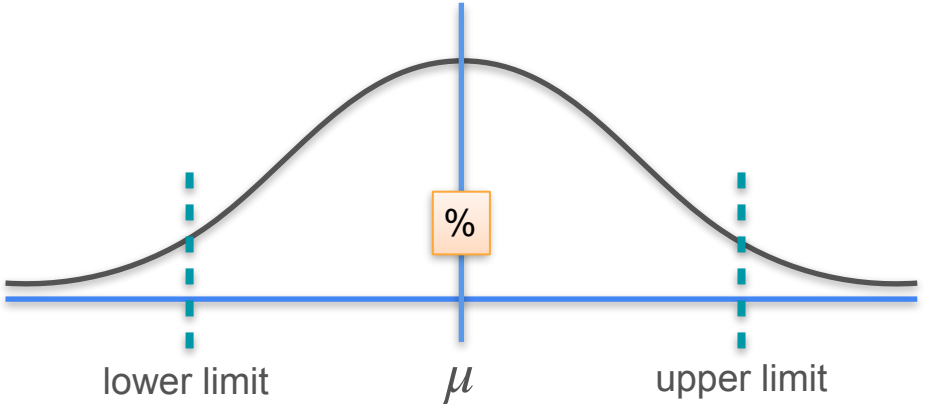

Confidence Interval - Intuition

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Confidence level

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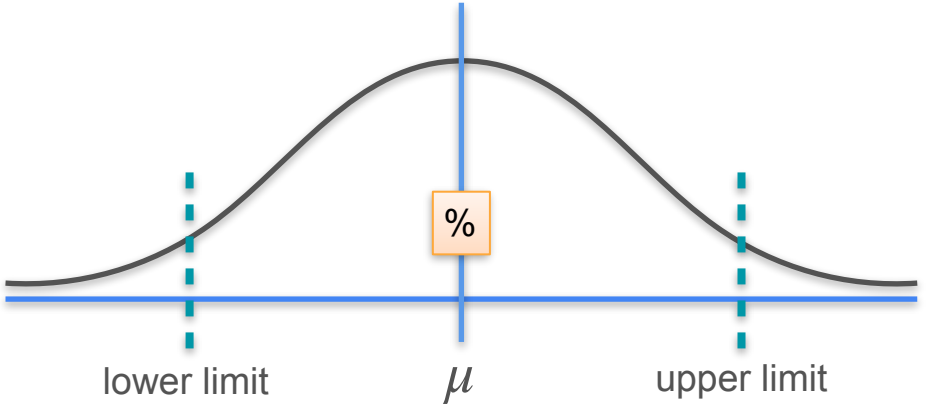

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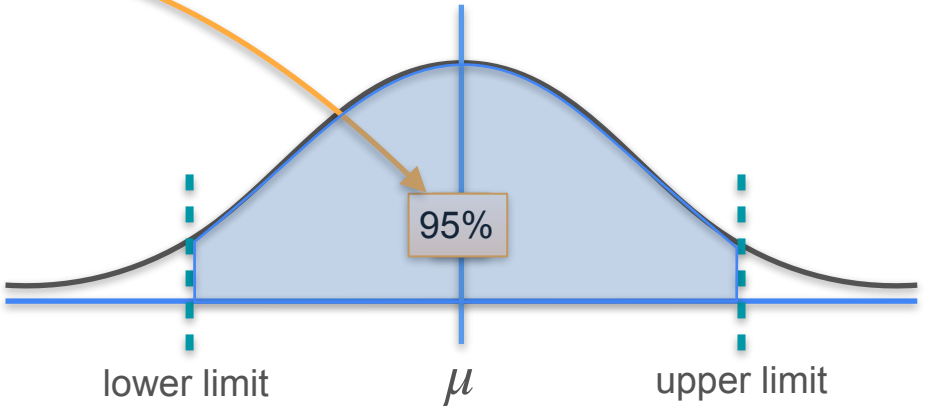

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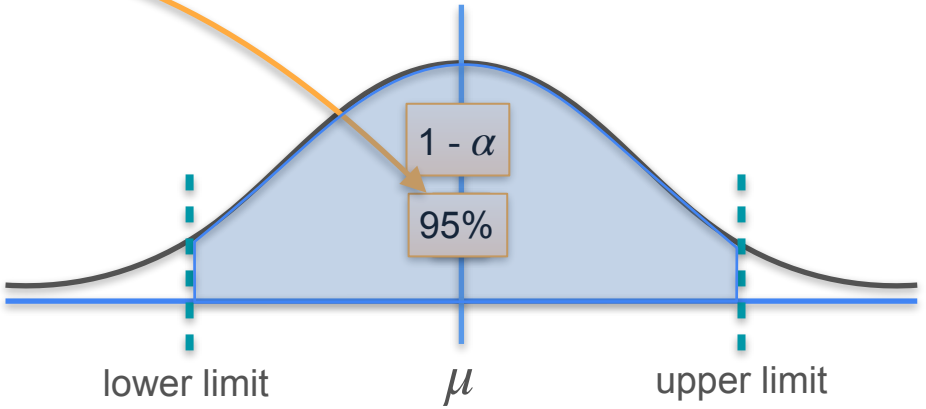

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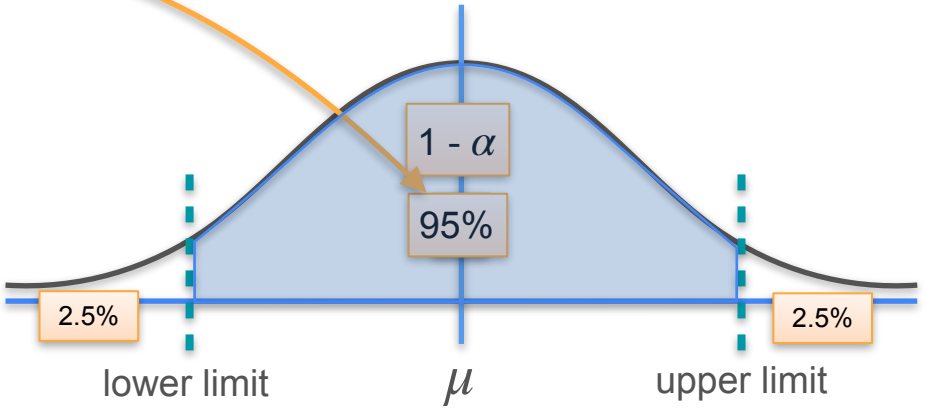

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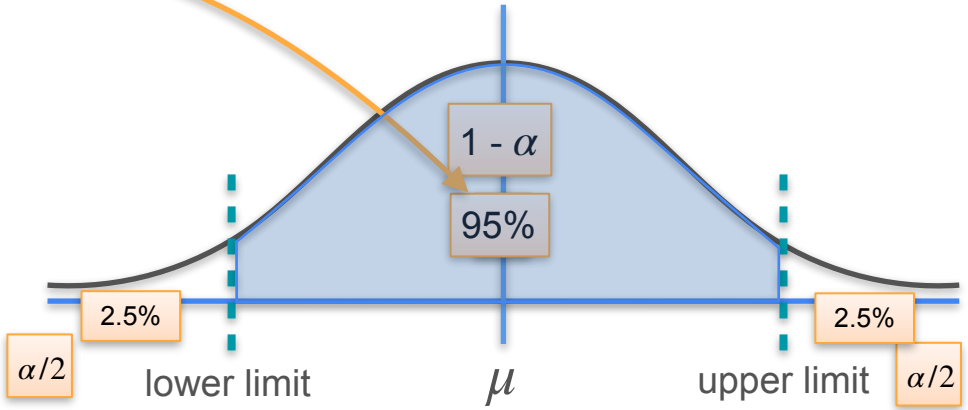

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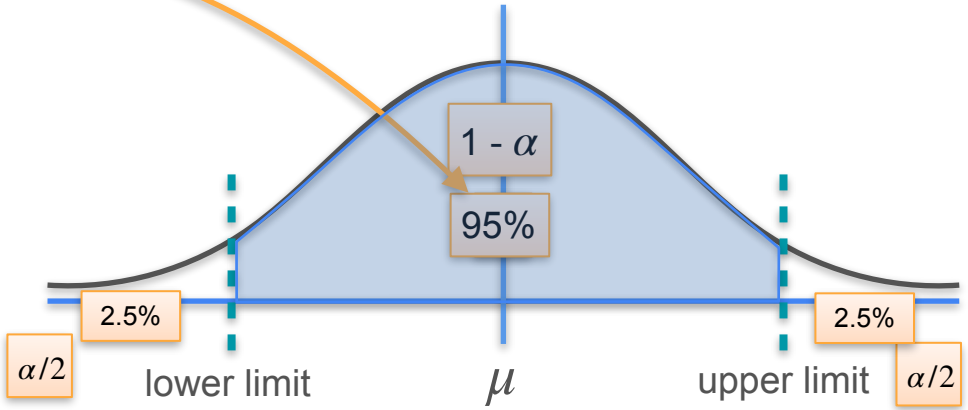

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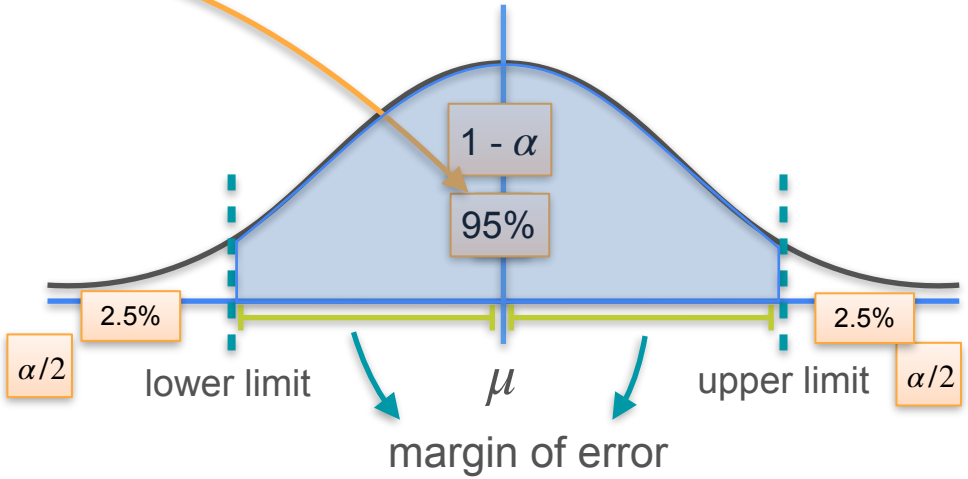

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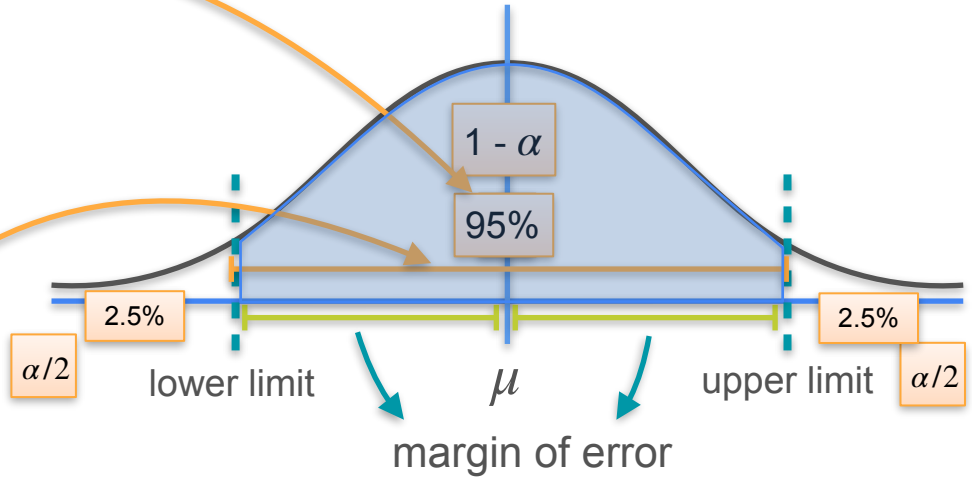

Confidence Interval - Intuition

$$n = 1$$

Known σ

95%

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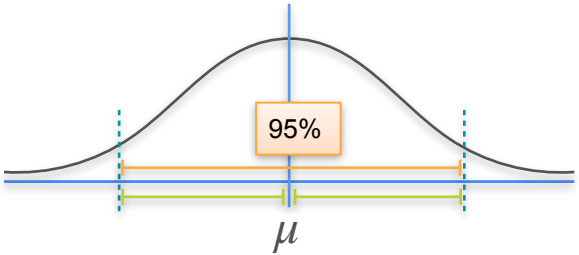

Confidence Interval - Intuition

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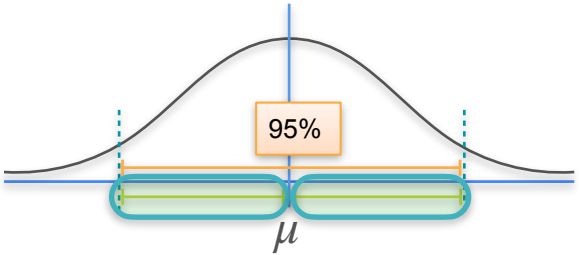
Known σ

95%

Margin of error



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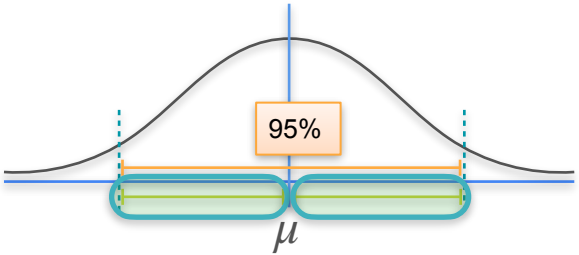

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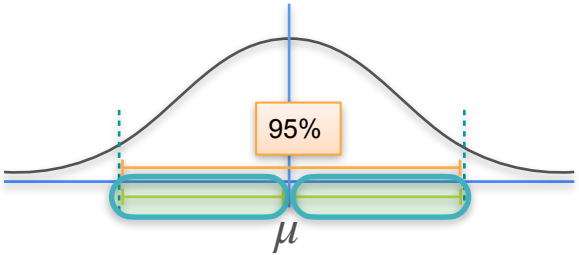

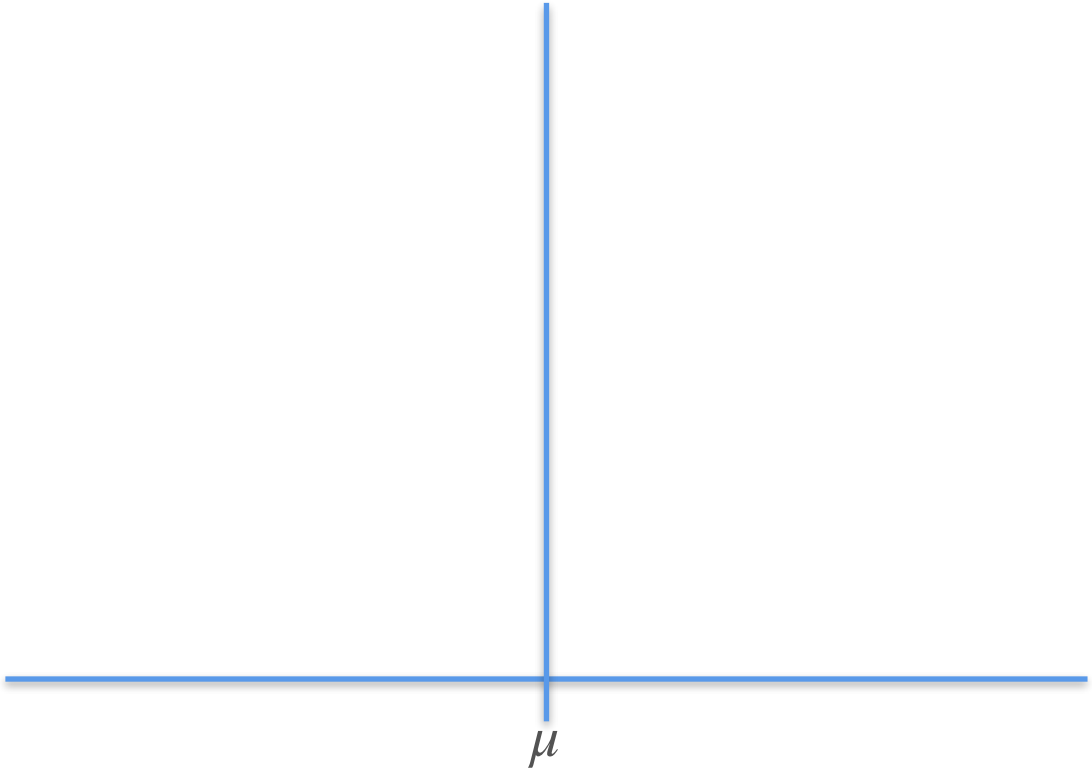

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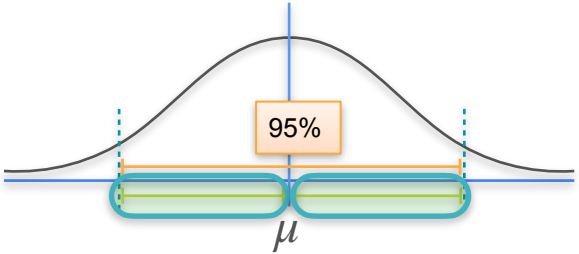

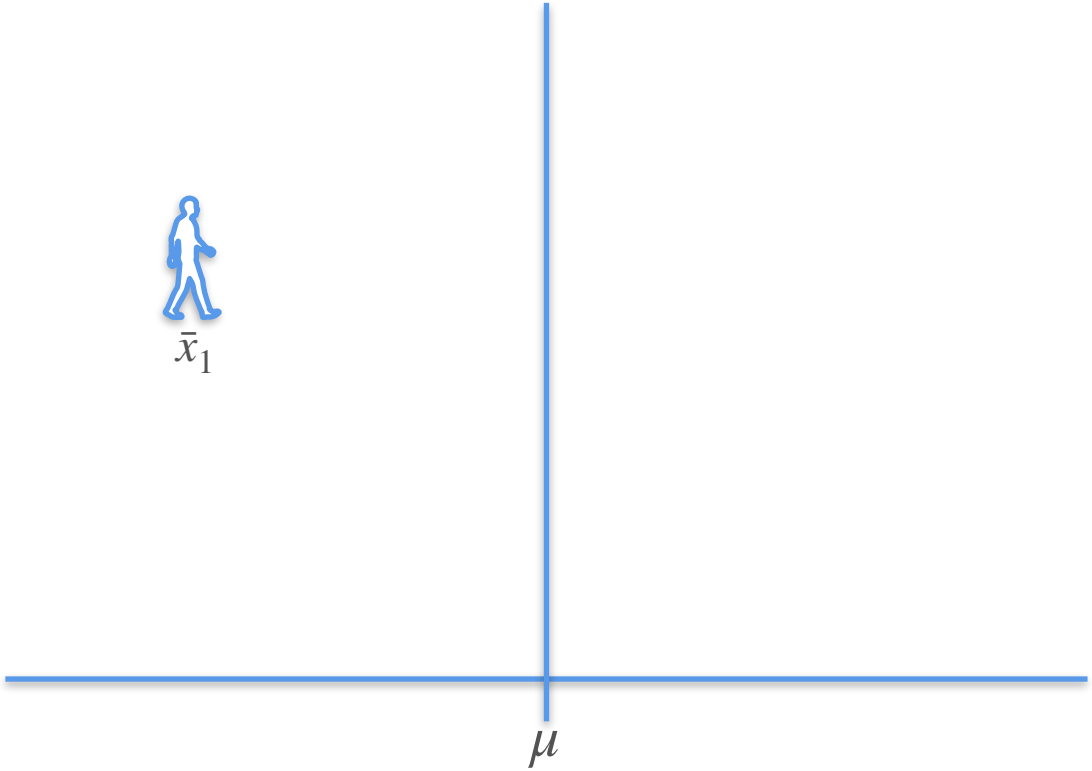

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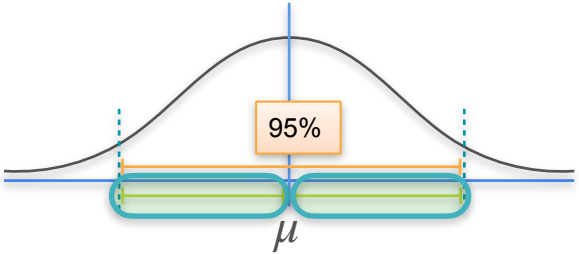

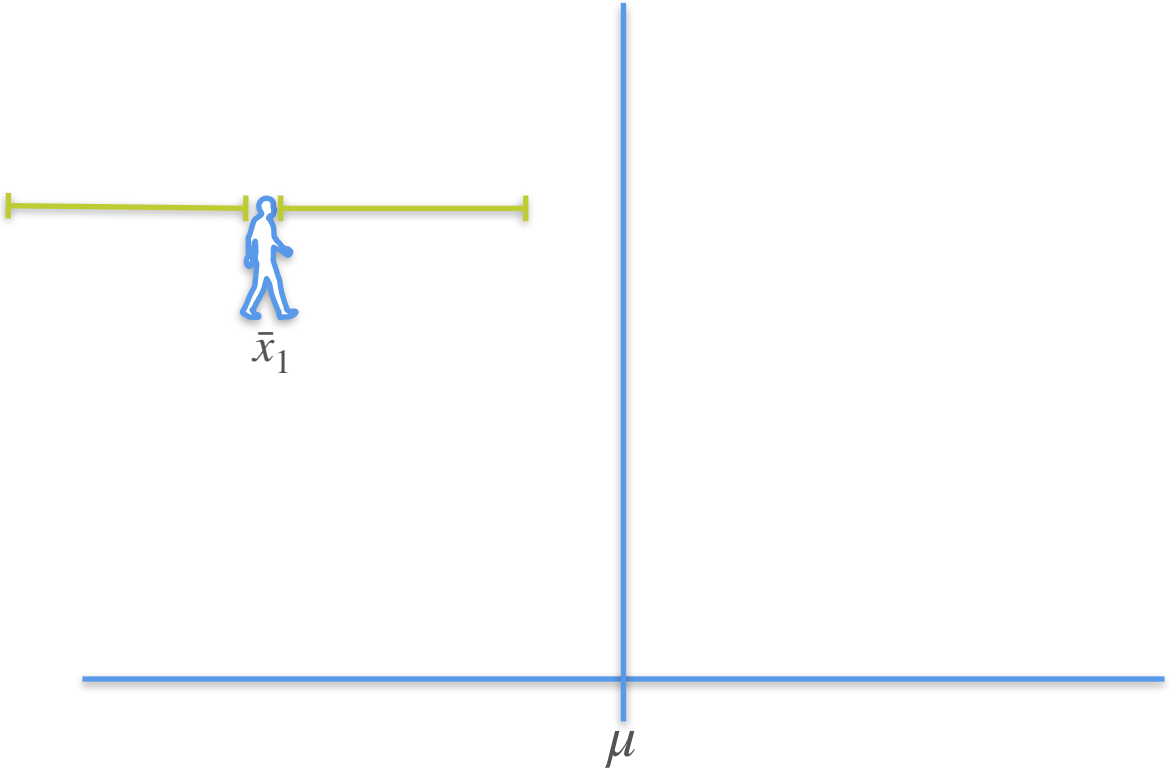

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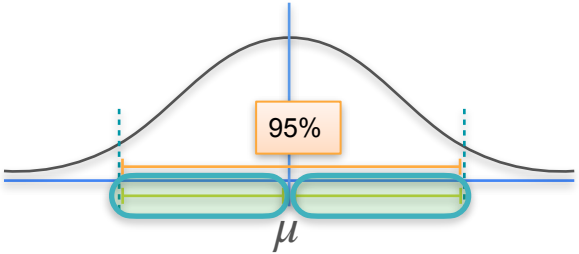

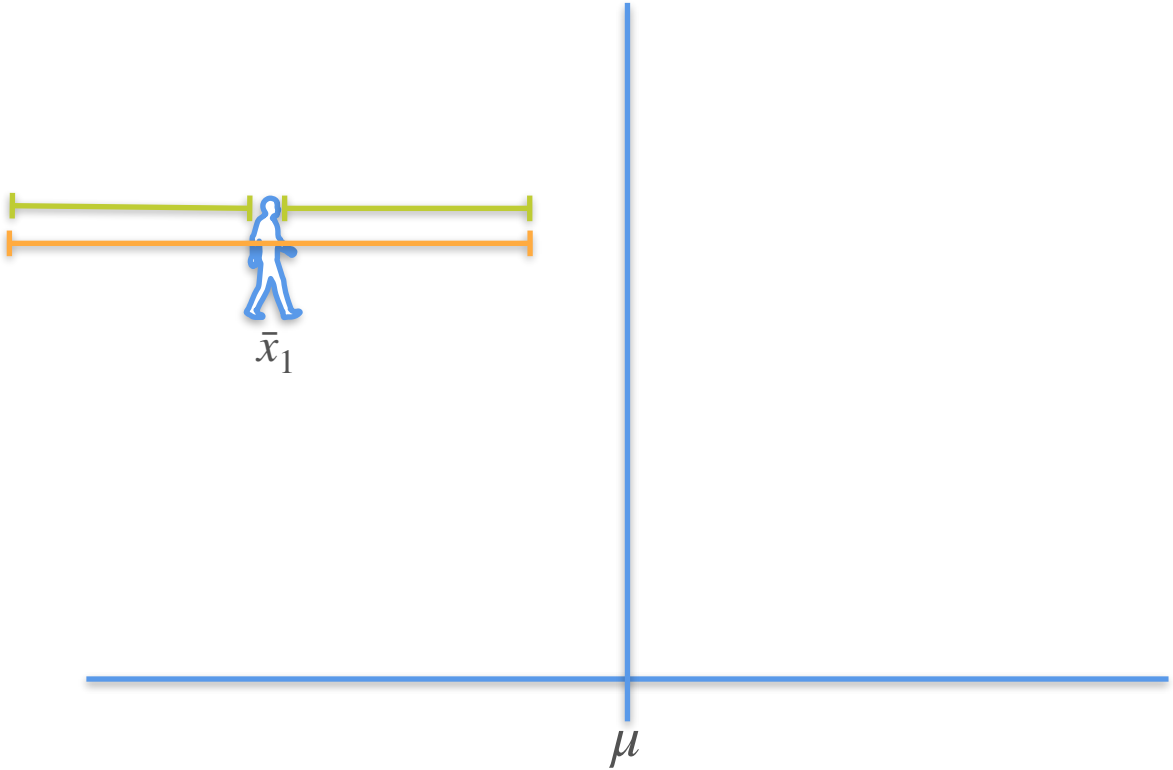

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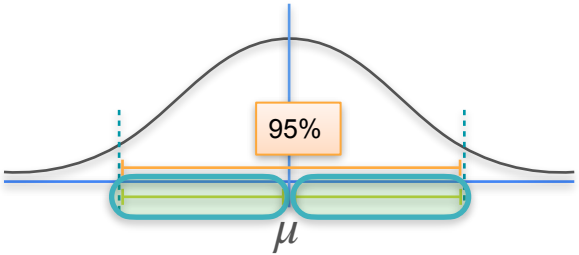

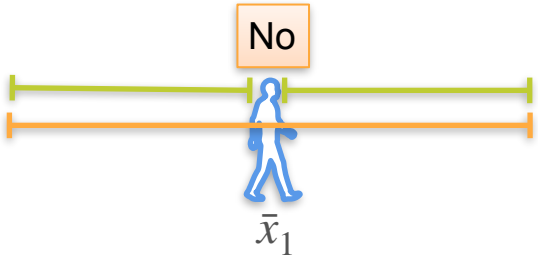

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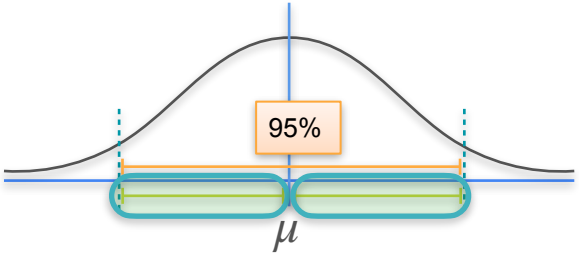
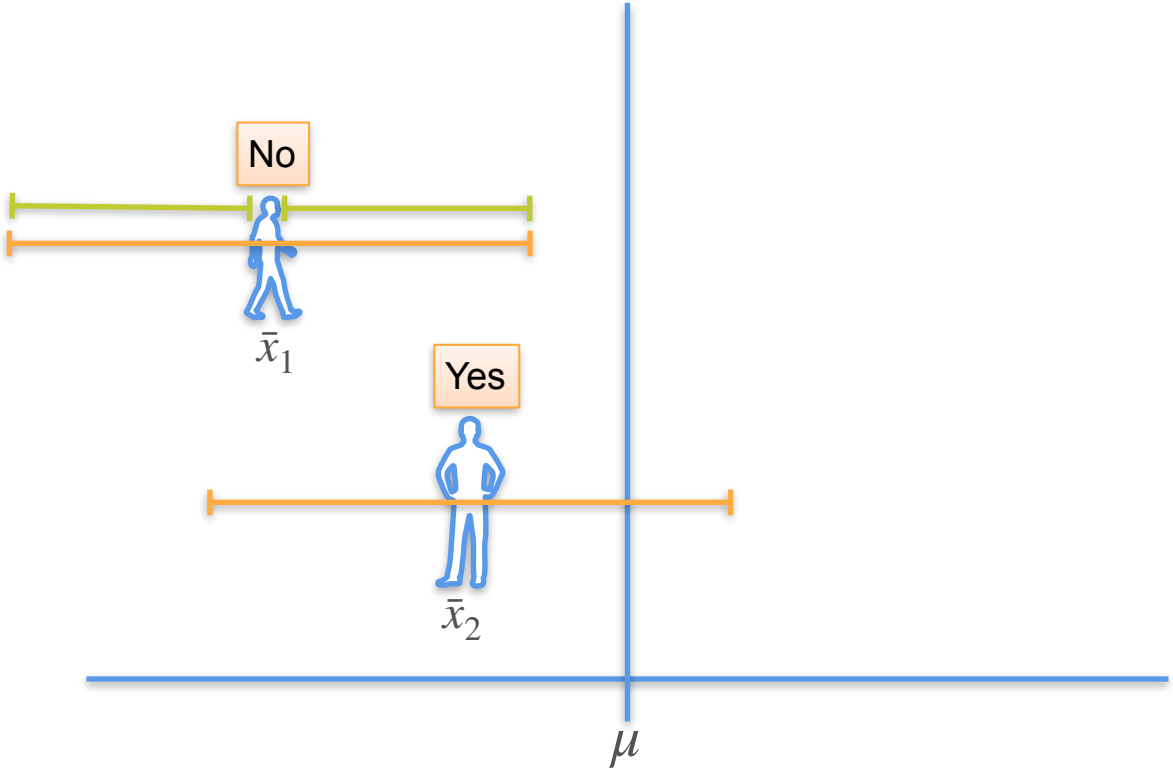
Margin of error





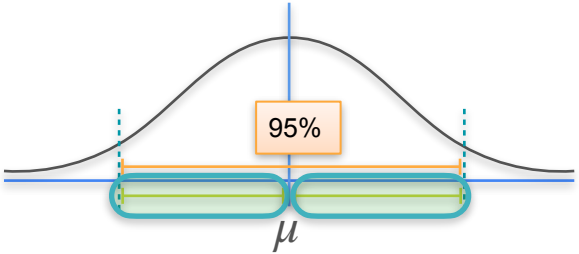
Confidence Interval - Intuition

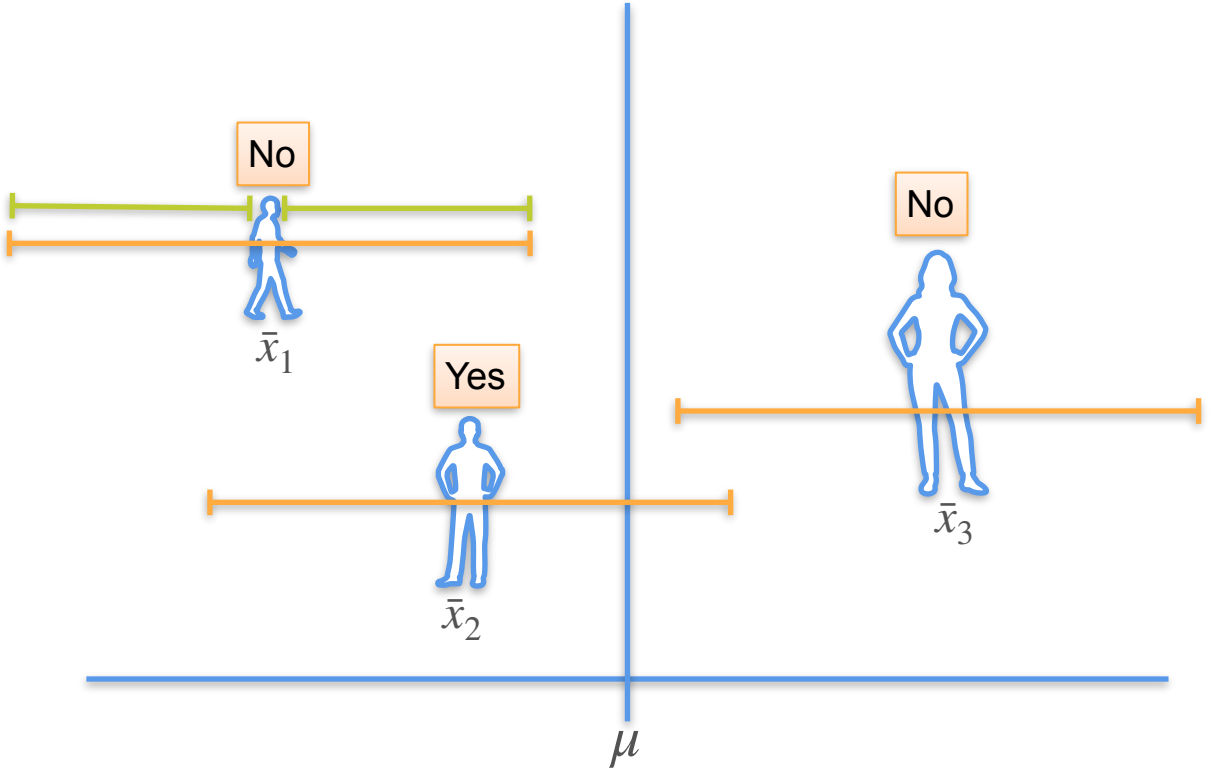
$n = 1$

Known σ

95%

Margin of error





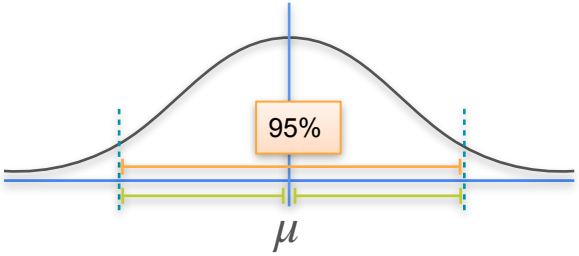
Confidence Interval - Intuition

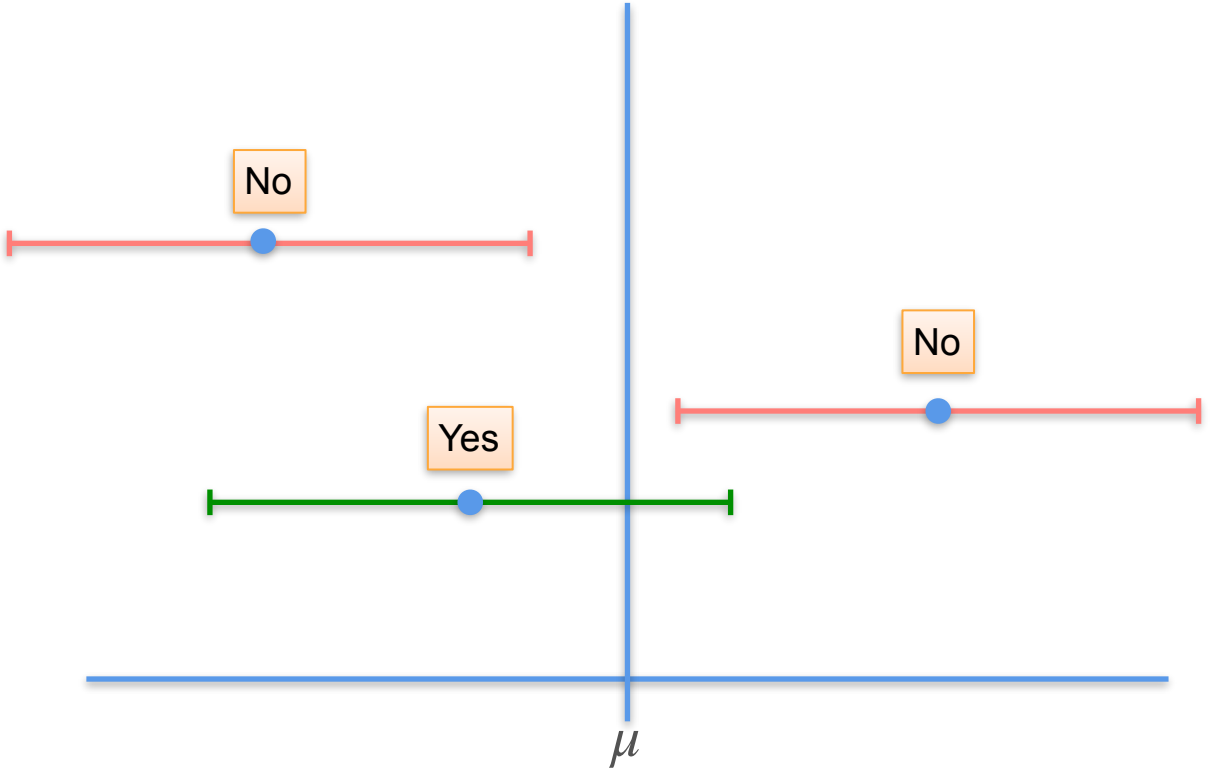
$n = 1$

Known σ

95%

Margin of error





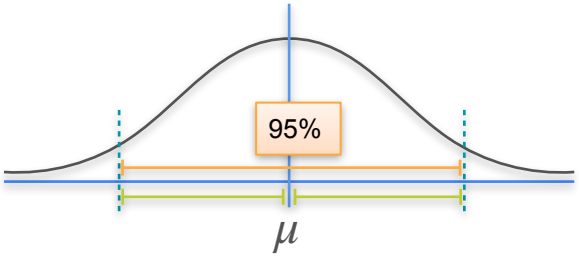
Confidence Interval - Intuition

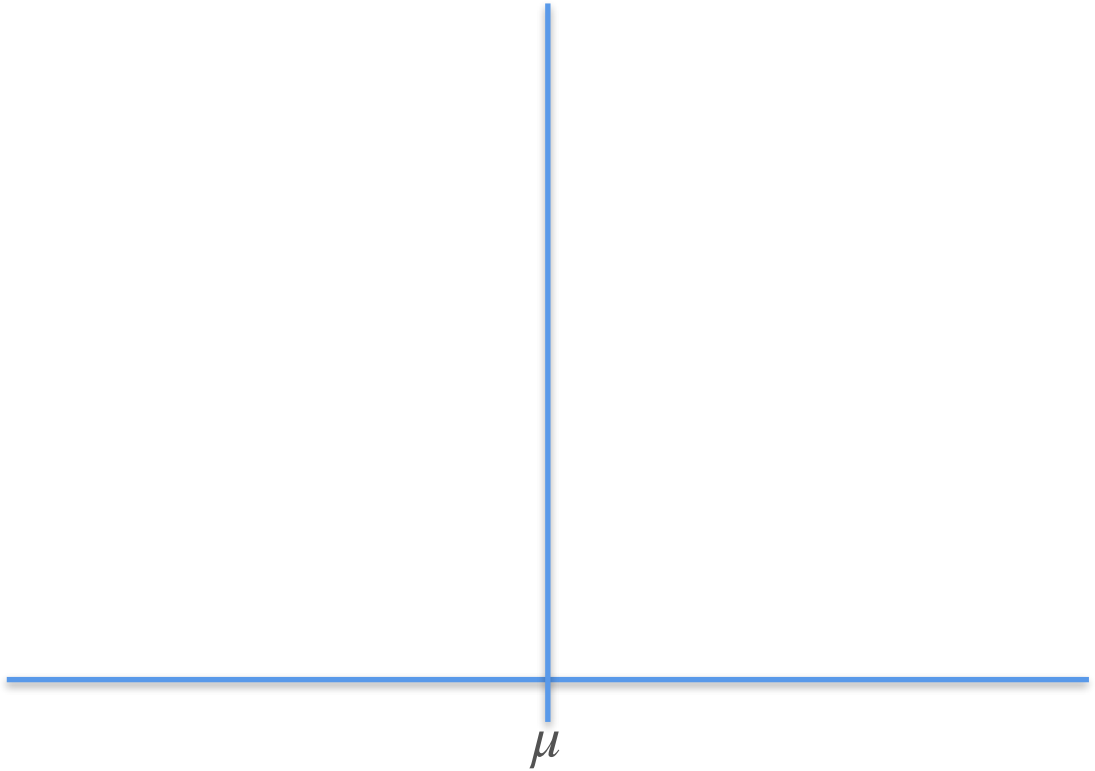
$n = 1$

Known σ

95%

Margin of error





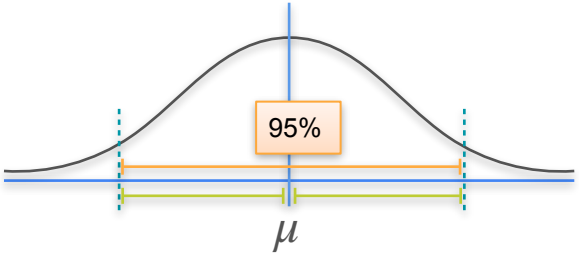
Confidence Interval - Intuition

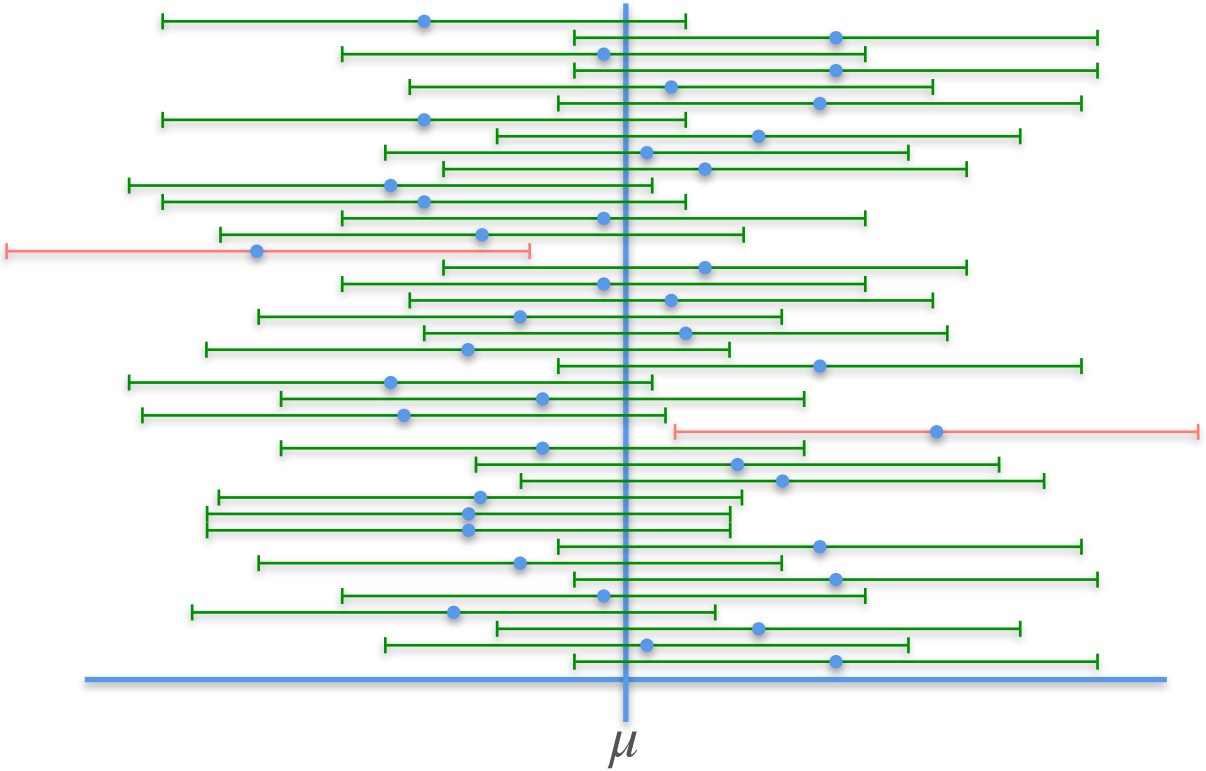
$n = 1$

Known σ

95%

Margin of error





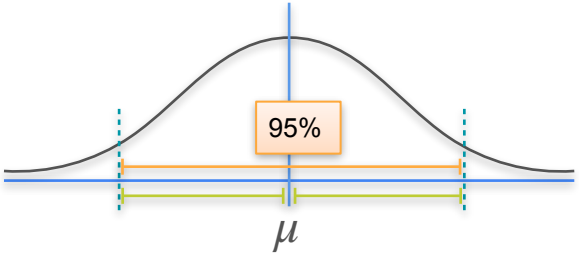
Confidence Interval - Intuition

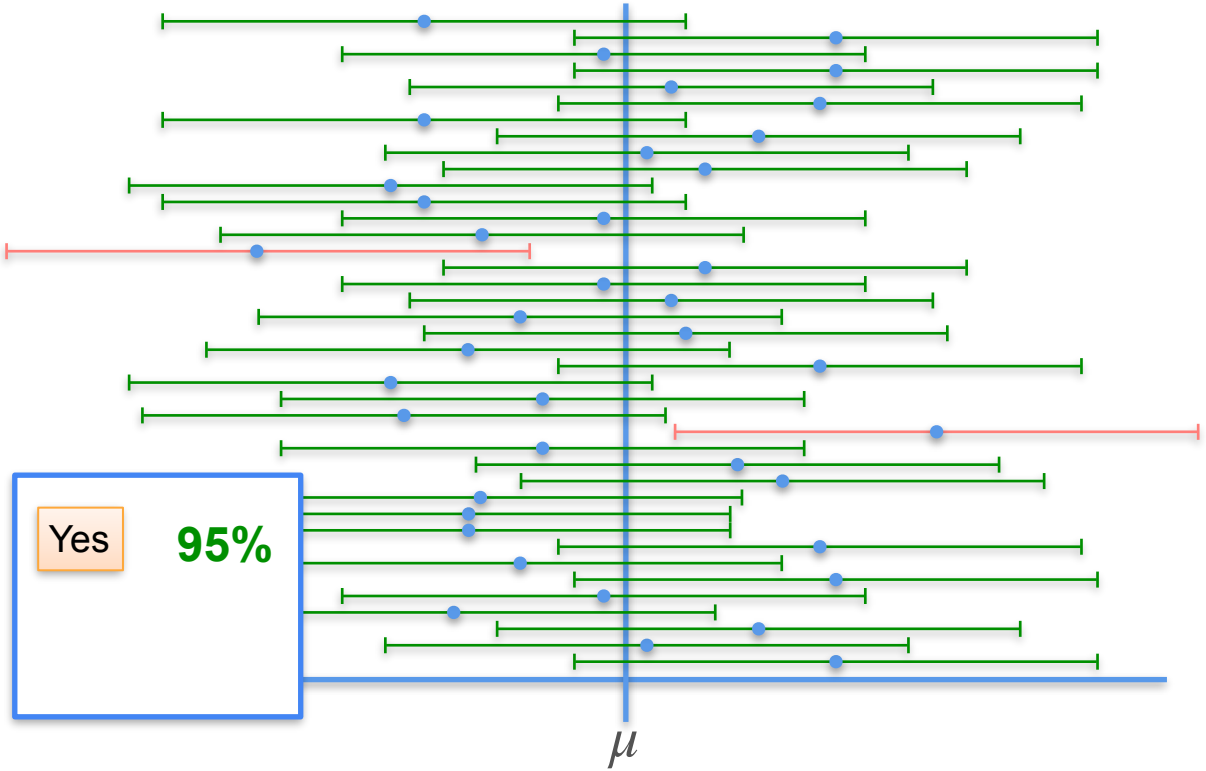
$n = 1$

Known σ

95%

Margin of error





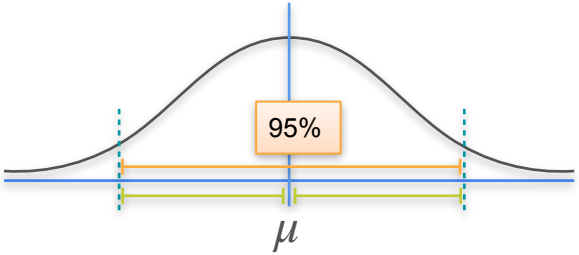
Confidence Interval - Intuition

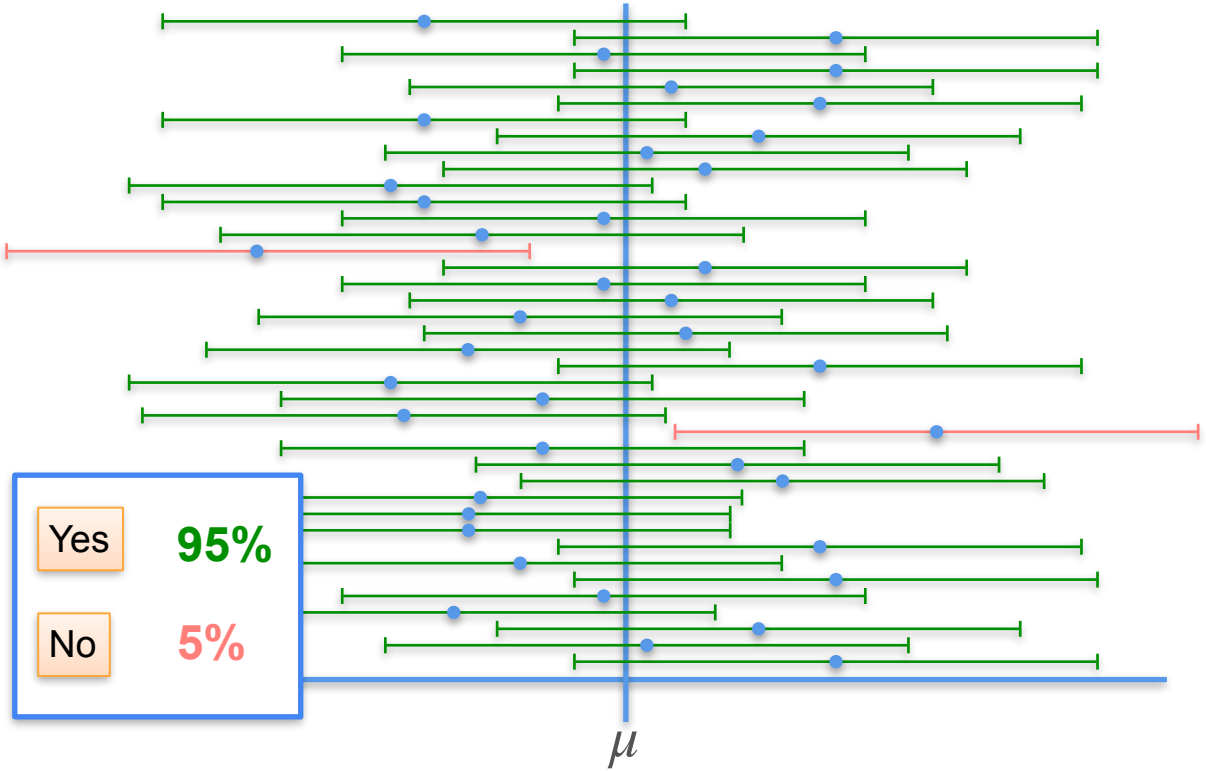
$n = 1$

Known σ

95%

Margin of error





Confidence Interval - Intuition

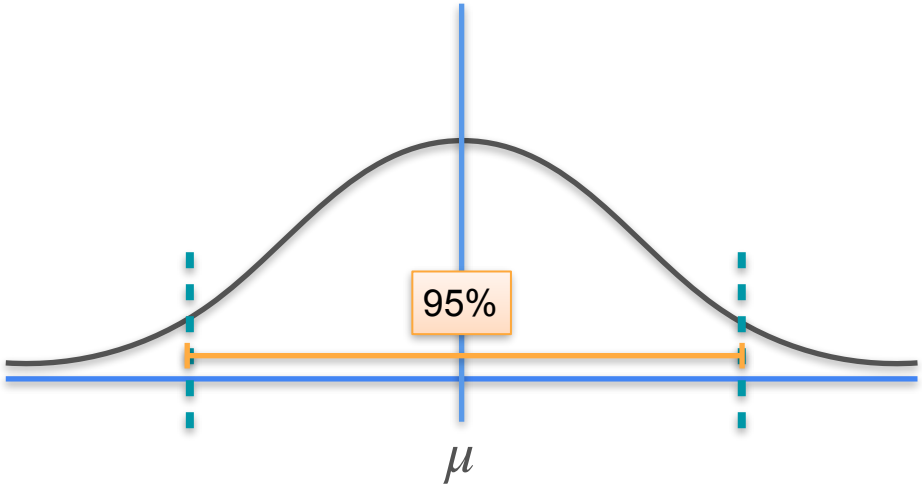
$n = 1$

$\bar{x}$

Confidence Interval - Intuition

$n = 1$

$\bar{x}$



Confidence Interval - Intuition

$n = 1$

$\bar{x}$

Confidence Interval - Intuition

$n = 1$

$\bar{x}$

Central Limit Theorem

$$\bar{X} \sim \mathcal{N}(\mu, \sigma^2)$$

Confidence Interval - Intuition

$n = 1$

$\bar{x}$

Central Limit Theorem

$$\bar{X} \sim \mathcal{N}(\mu, \sigma^2)$$

$$\mu_{\bar{x}} = \mu$$

Confidence Interval - Intuition

$n = 1$

$\bar{x}$

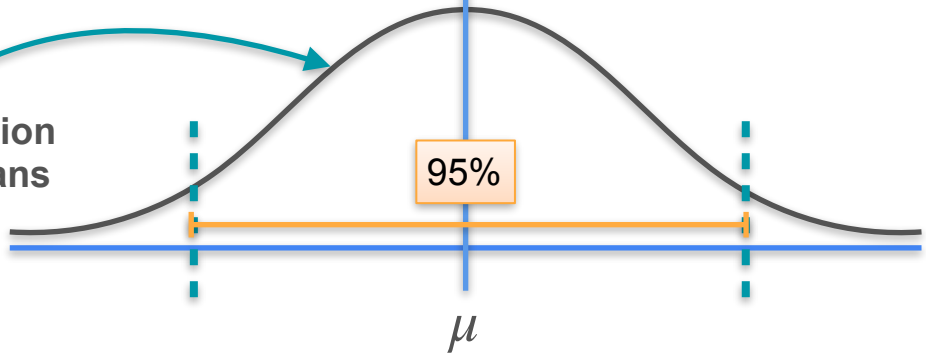
Central Limit Theorem

$$\bar{X} \sim \mathcal{N}(\mu, \sigma^2)$$

mean of the sample means

$\mu_{\bar{x}} = \mu$

sampling distribution of the sample means



Confidence Interval - Intuition

$n = 1$

$\bar{x}$

Central Limit Theorem

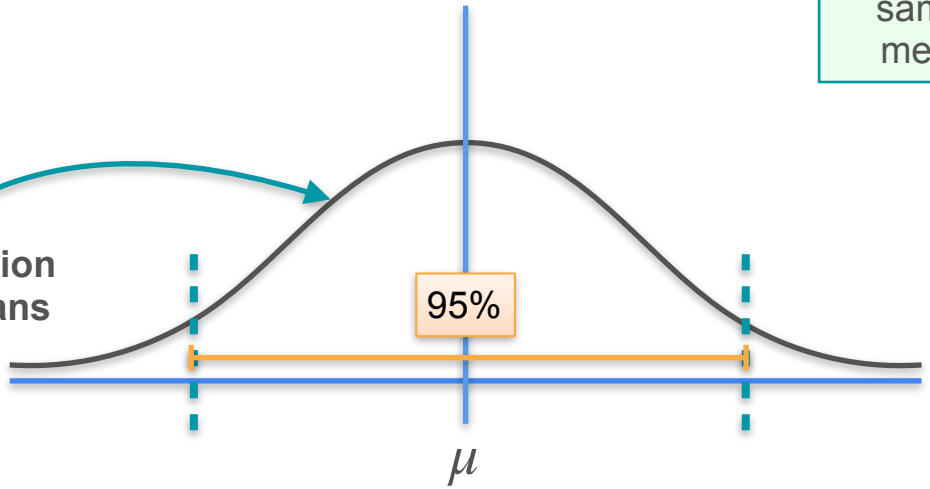
$$\bar{X} \sim \mathcal{N}(\mu, \sigma^2)$$

mean of the sample means

$\mu_{\bar{x}} = \mu$

population mean

sampling distribution of the sample means



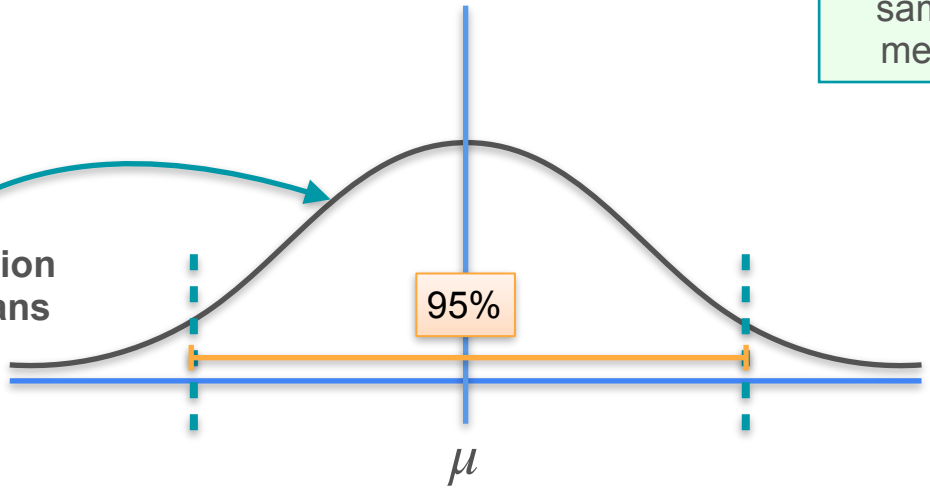
Confidence Interval - Intuition

$n = 1$

$\bar{x}$

Central Limit Theorem

$$\bar{X} \sim \mathcal{N}(\mu, \sigma^2)$$



mean of the sample means $\mu_{\bar{x}} = \mu$ population mean

$$\sigma_{\bar{x}} = \frac{\sigma}{\sqrt{n}}$$

standard deviation of the sample means

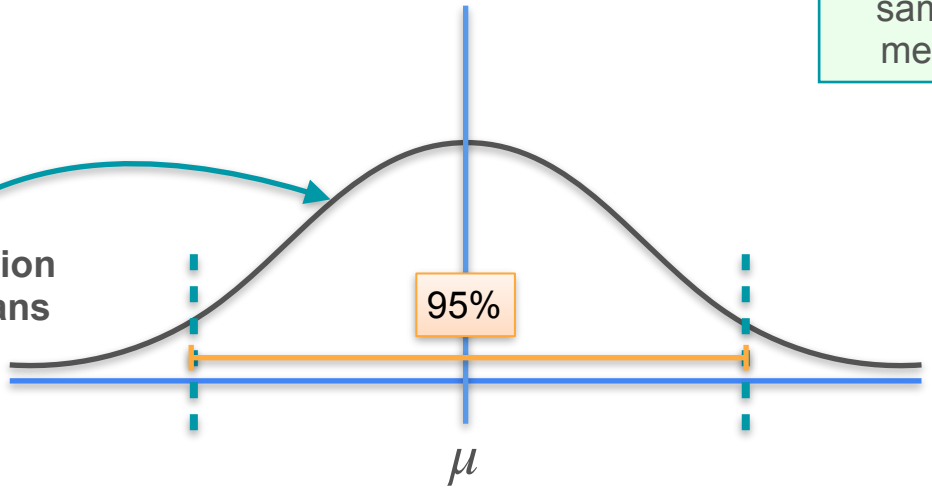
Confidence Interval - Intuition

$n = 1$

$\bar{x}$

Central Limit Theorem

$$\bar{X} \sim \mathcal{N}(\mu, \sigma^2)$$



sampling distribution of the sample means

mean of the sample means

$\mu_{\bar{x}} = \mu$

population mean

$$\sigma_{\bar{x}} = \frac{\sigma}{\sqrt{n}} = \frac{\sigma}{\sqrt{1}}$$

standard deviation of the sample means

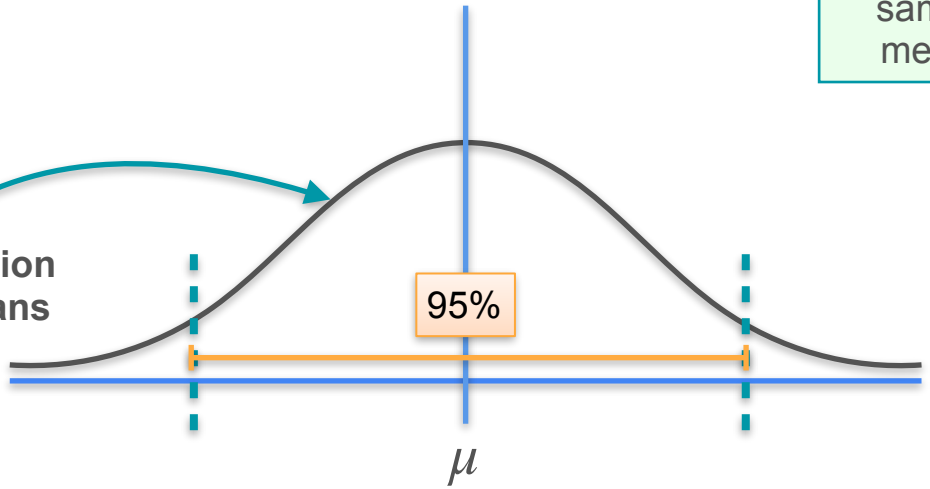
Confidence Interval - Intuition

$n = 1$

$\bar{x}$

Central Limit Theorem

$$\bar{X} \sim \mathcal{N}(\mu, \sigma^2)$$



mean of the sample means

$\mu_{\bar{x}} = \mu$

population mean

$$\sigma_{\bar{x}} = \frac{\sigma}{\sqrt{n}} = \frac{\sigma}{\sqrt{1}} = \sigma$$

standard deviation of the sample means

Confidence Interval - Intuition

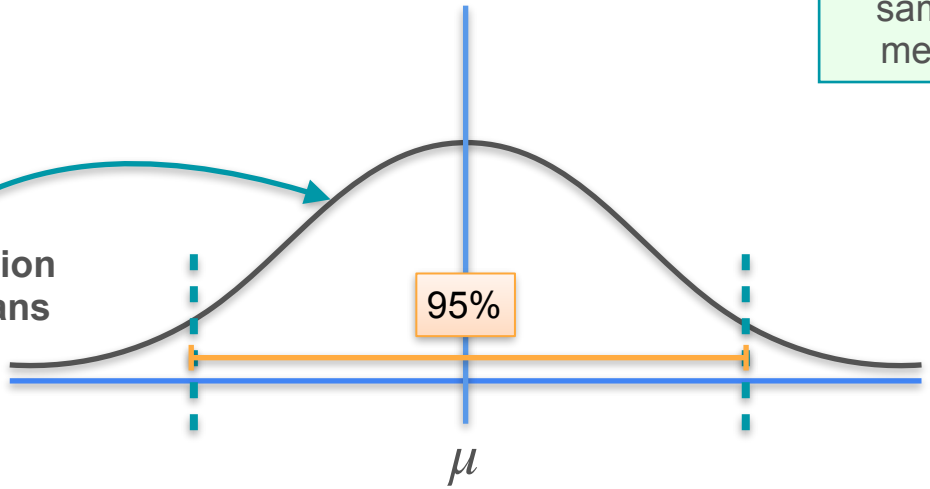
$n = 1$

$\bar{x}$

Central Limit Theorem

$$\bar{X} \sim \mathcal{N}(\mu, \sigma^2)$$

sampling distribution of the sample means



Population standard deviation (σ)

mean of the sample means

$$\mu_{\bar{x}} = \mu$$

population mean

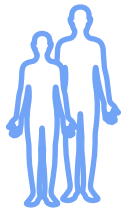
$$\sigma_{\bar{x}} = \frac{\sigma}{\sqrt{n}} = \frac{\sigma}{\sqrt{1}} = \sigma$$

standard deviation of the sample means

Confidence Interval - Intuition

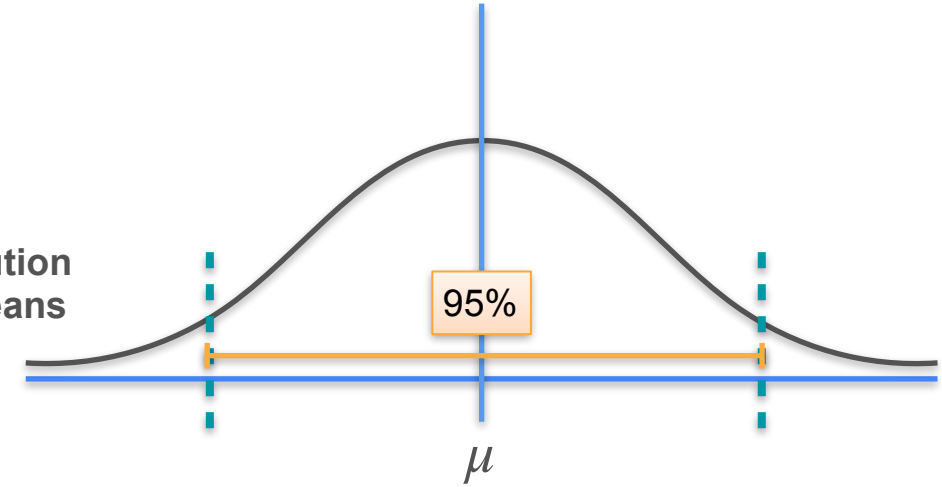
Central Limit Theorem

Population standard deviation (σ)



$\bar{x}$

sampling distribution of the sample means

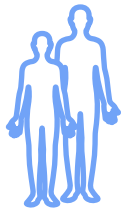


Confidence Interval - Intuition

$n = 2$

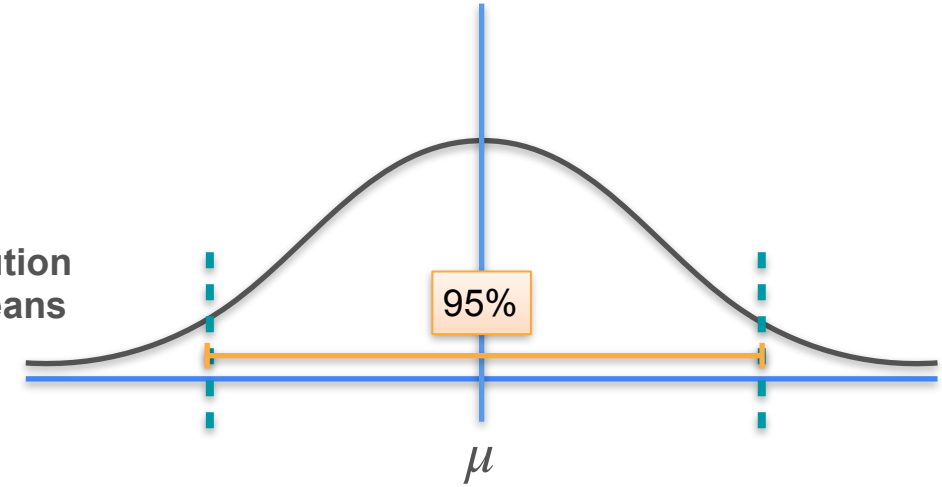
Central Limit Theorem

Population standard deviation (σ)



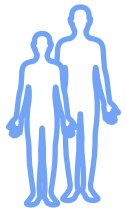
$\bar{x}$

sampling distribution of the sample means



Confidence Interval - Intuition

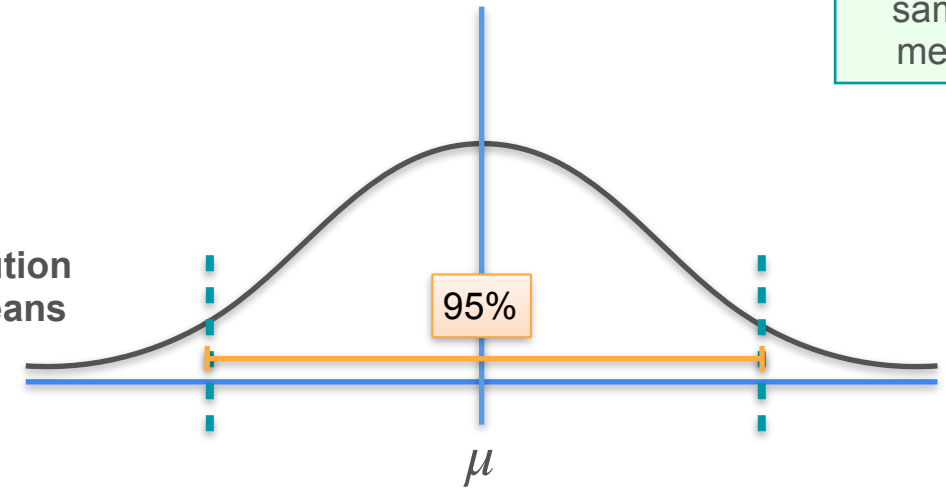
$n = 2$



$\bar{x}$

sampling distribution of the sample means

Central Limit Theorem



Population standard deviation (σ)

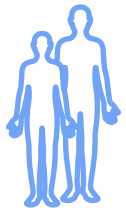
mean of the sample means

$\mu_{\bar{x}} = \mu$

population mean

Confidence Interval - Intuition

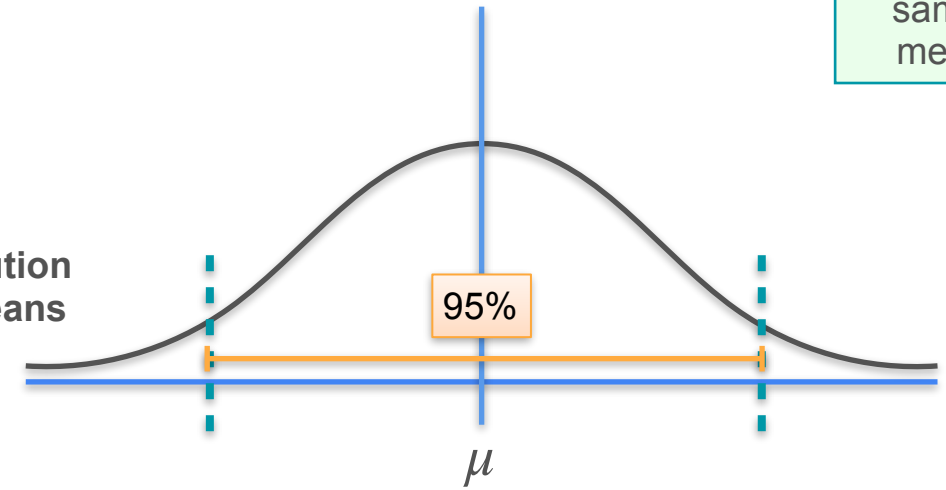
$n = 2$



$\bar{x}$

sampling distribution of the sample means

Central Limit Theorem



Population standard deviation (σ)

mean of the sample means

$\mu_{\bar{x}} = \mu$

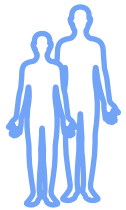
population mean

$$\sigma_{\bar{x}} = \frac{\sigma}{\sqrt{n}}$$

standard deviation of the sample means

Confidence Interval - Intuition

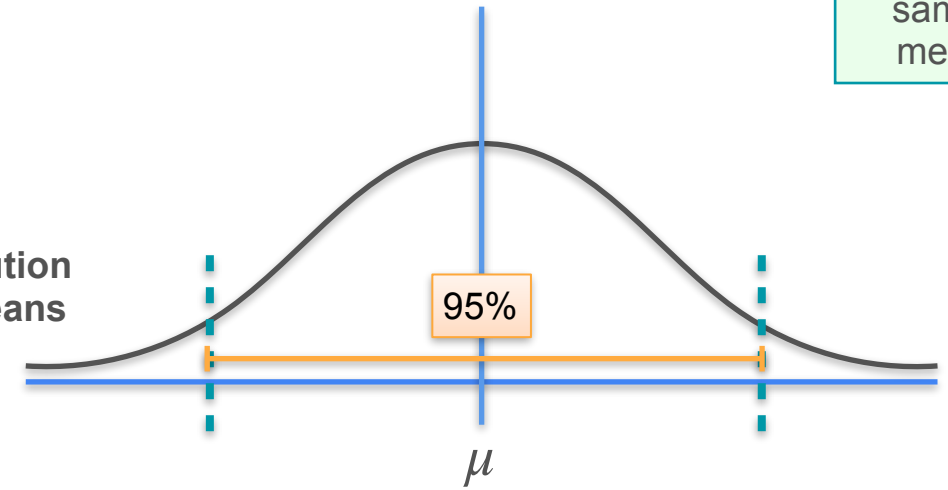
$n = 2$



$\bar{x}$

sampling distribution of the sample means

Central Limit Theorem



Population standard deviation (σ)

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standard deviation of the sample means

Confidence Interval - Intuition

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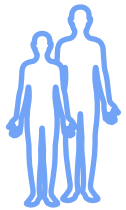
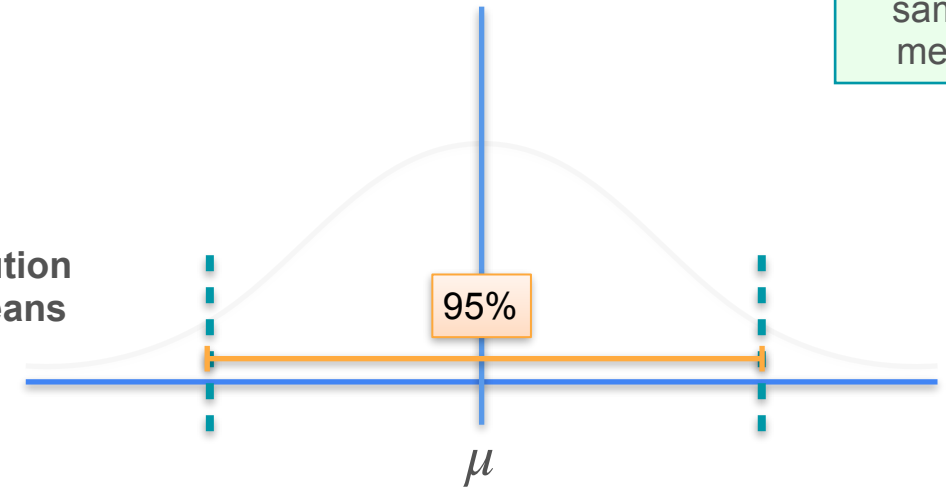


$\bar{x}$

sampling distribution of the sample means

Central Limit Theorem



Population standard deviation (σ)

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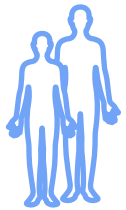
standard deviation of the sample means

Confidence Interval - Intuition

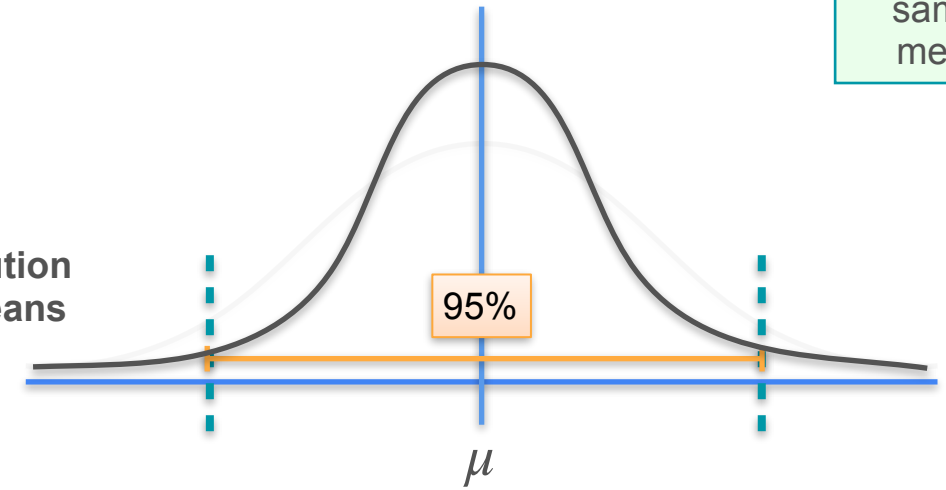
$n = 2$



$\bar{x}$

sampling distribution of the sample means

Central Limit Theorem



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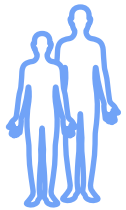
standard deviation of the sample means

Confidence Interval - Intuition

$n = 2$

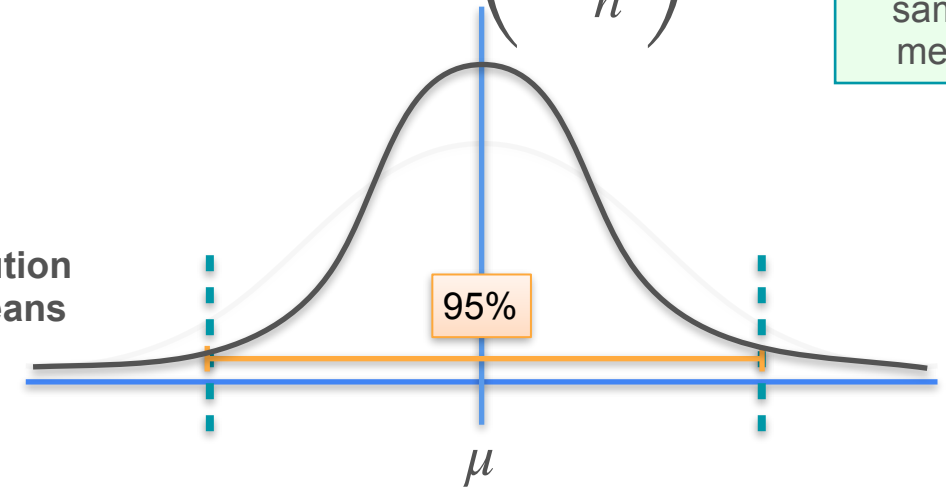


$\bar{x}$

sampling distribution of the sample means

Central Limit Theorem

$$\bar{X} \sim \mathcal{N}\left(\mu, \frac{\sigma^2}{n}\right)$$



Population standard deviation (σ)

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standard deviation of the sample means

Confidence Interval - Intuition

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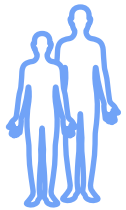

$\bar{x}$

sampling distribution of the sample means

Central Limit Theorem

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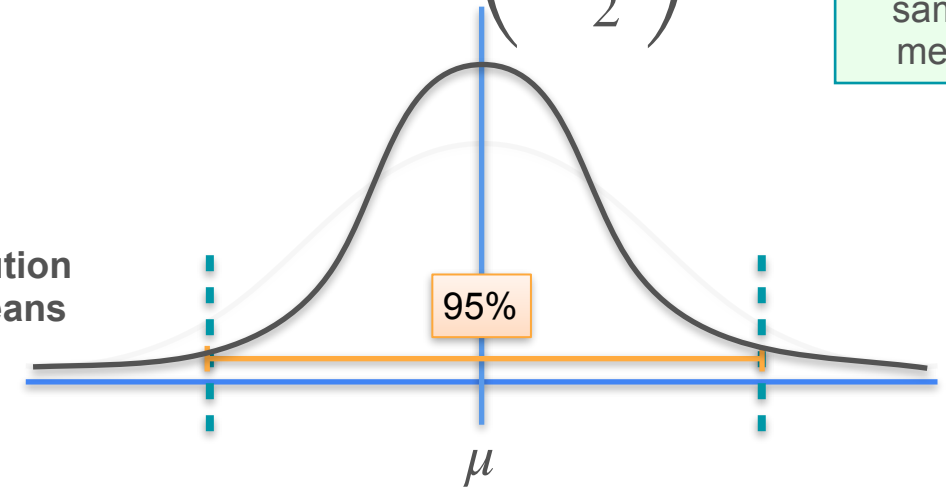

Population standard deviation (σ)

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standard deviation of the sample means

Confidence Interval - Intuition

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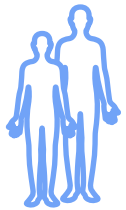

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sampling distribution of the sample means

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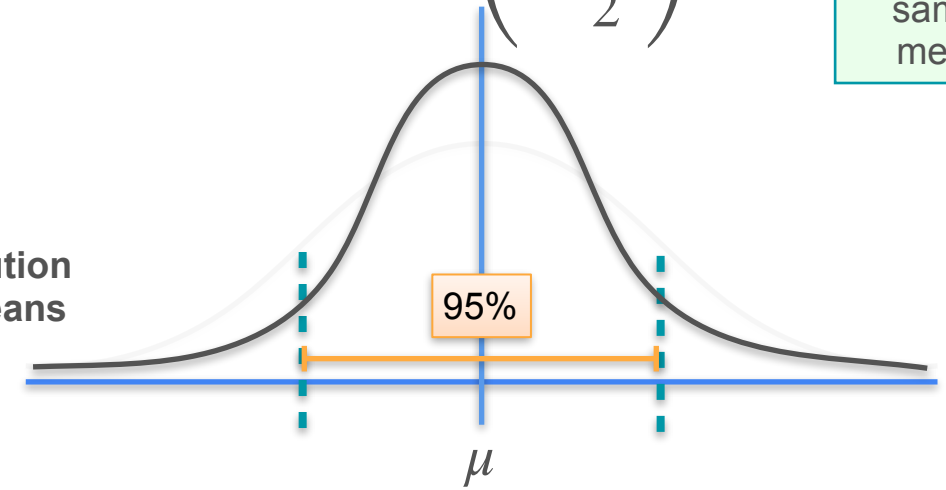


Population standard deviation (σ)

mean of the sample means

$\mu_{\bar{x}} = \mu$

population mean

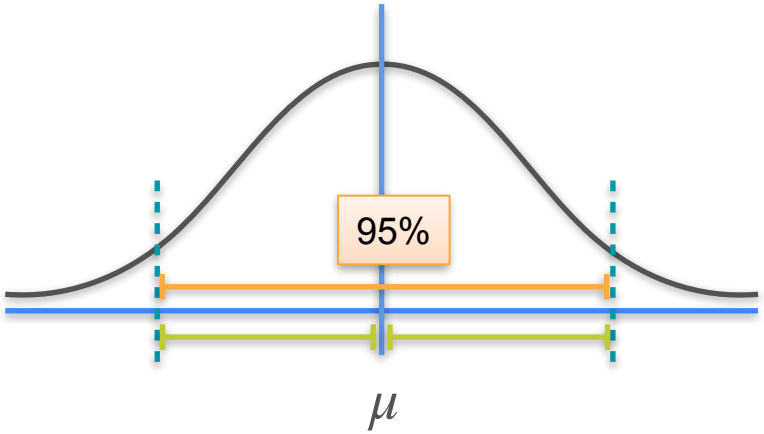
$$\sigma_{\bar{x}} = \frac{\sigma}{\sqrt{n}} = \frac{\sigma}{\sqrt{2}}$$

standard deviation of the sample means

Confidence Interval - Intuition

95%

$n = 1$

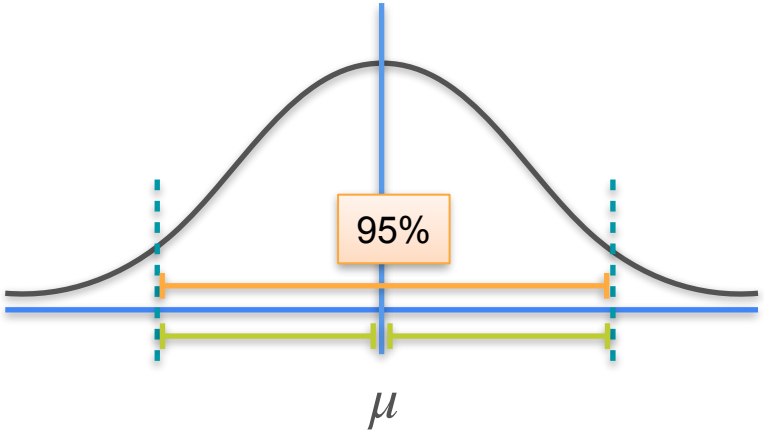


Confidence Interval - Intuition

95%

$$n = 1$$

$$\mathcal{N}\left(\mu, \frac{\sigma^2}{1}\right)$$

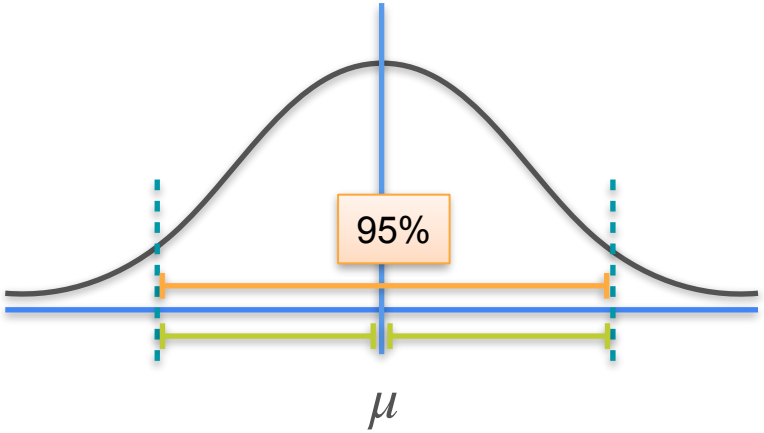


Confidence Interval - Intuition

95%

$n = 1$

$$\mathcal{N}\left(\mu, \frac{\sigma^2}{1}\right)$$



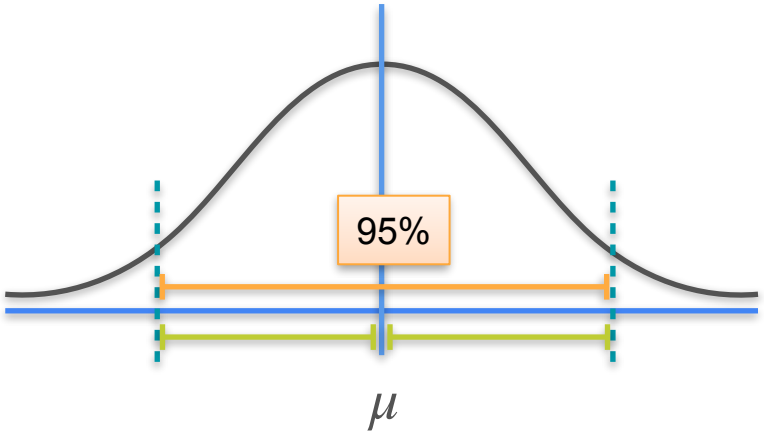
$n = 2$

Confidence Interval - Intuition

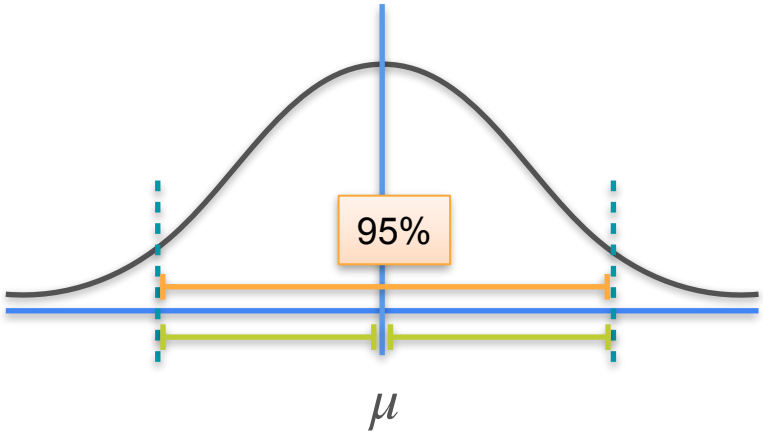
95%

$n = 1$

$$\mathcal{N}\left(\mu, \frac{\sigma^2}{1}\right)$$



$n = 2$

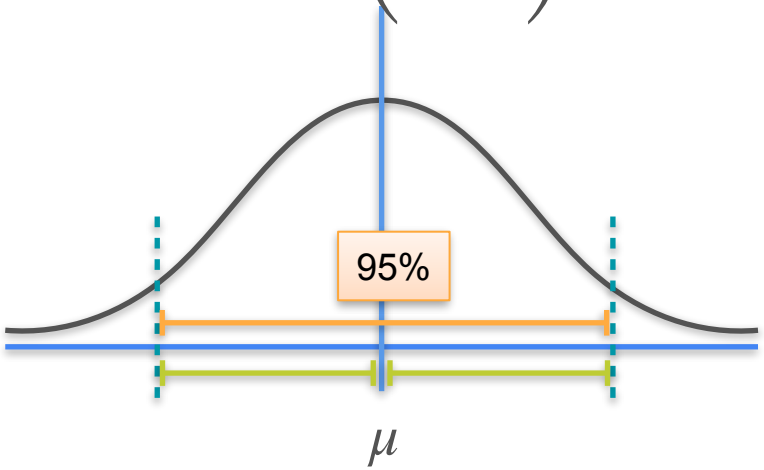


Confidence Interval - Intuition

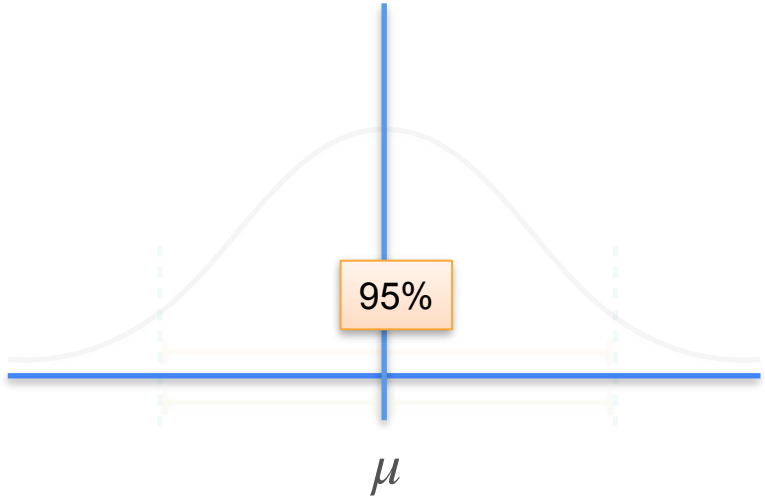
95%

$n = 1$

$$\mathcal{N}\left(\mu, \frac{\sigma^2}{1}\right)$$



$n = 2$

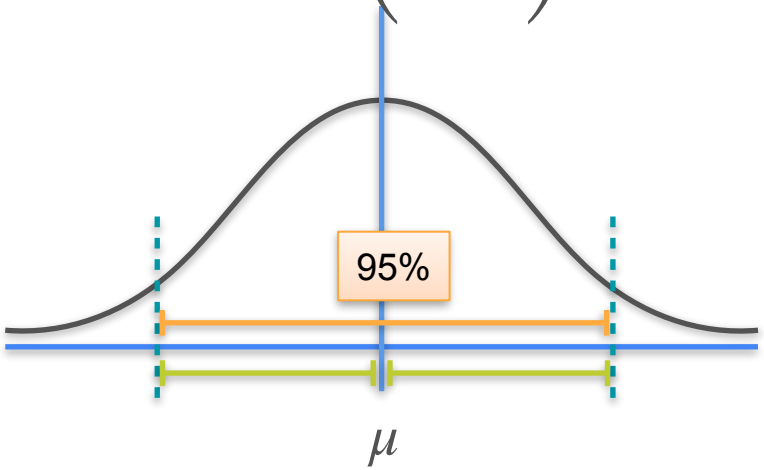


Confidence Interval - Intuition

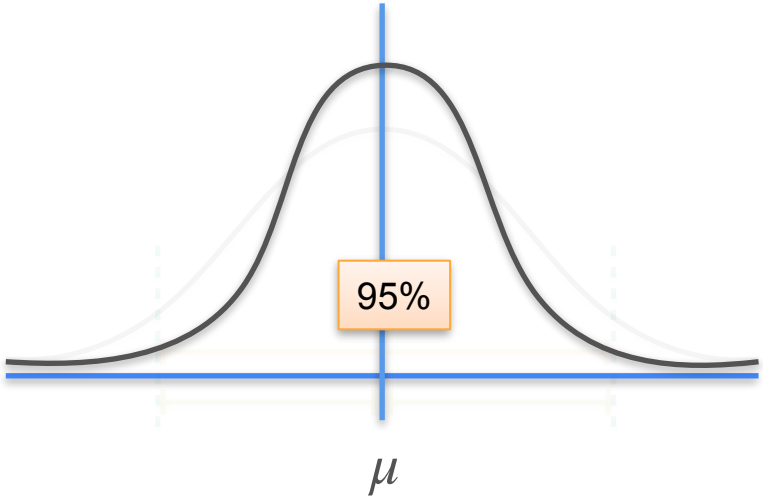
95%

$n = 1$

$$\mathcal{N}\left(\mu, \frac{\sigma^2}{1}\right)$$

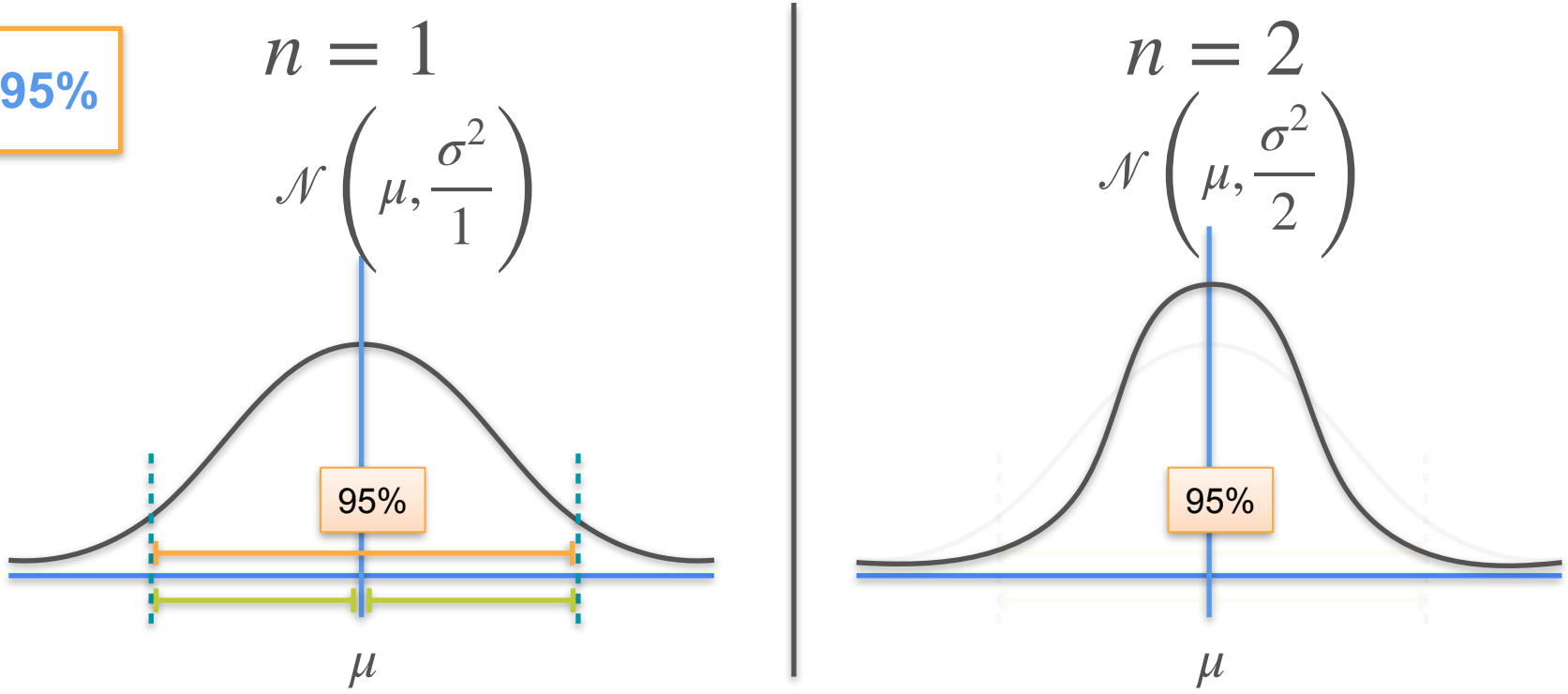


$n = 2$



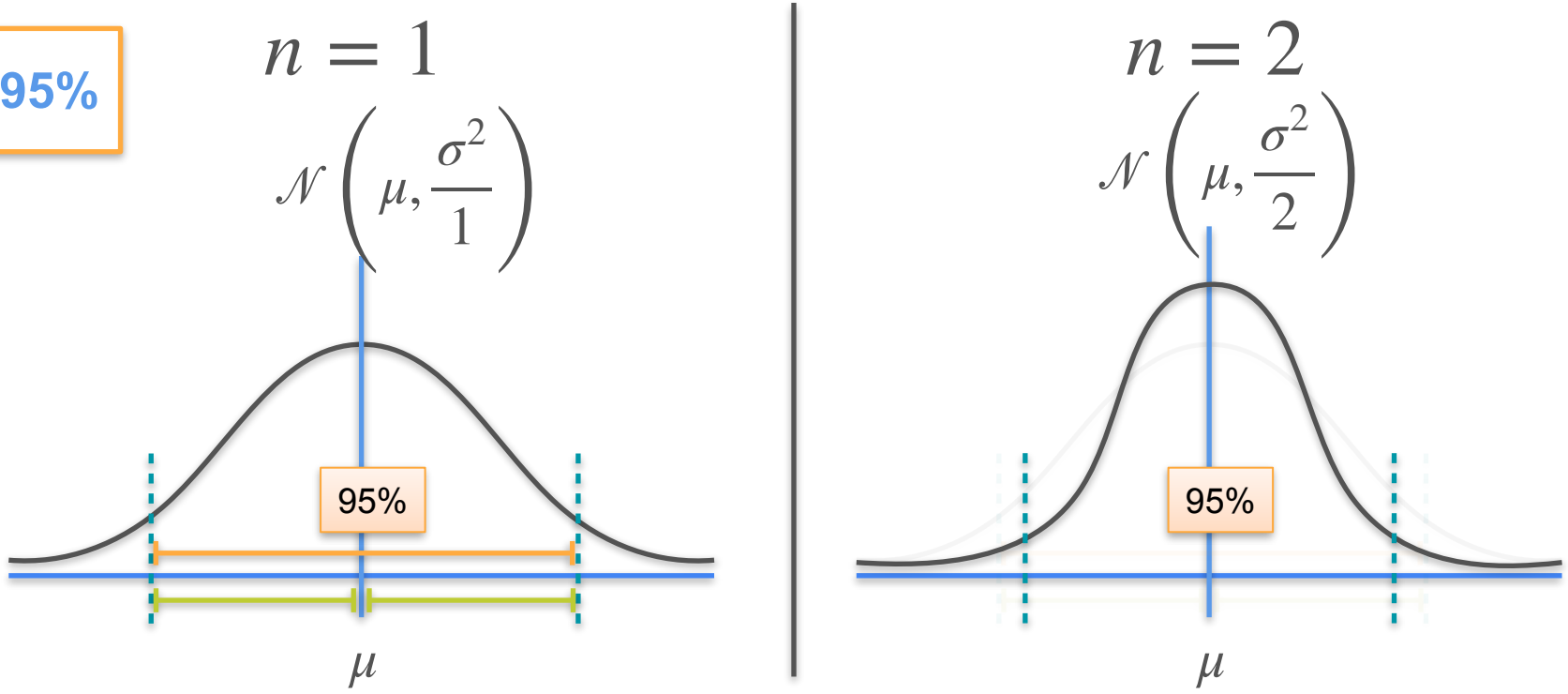
Confidence Interval - Intuition

95%



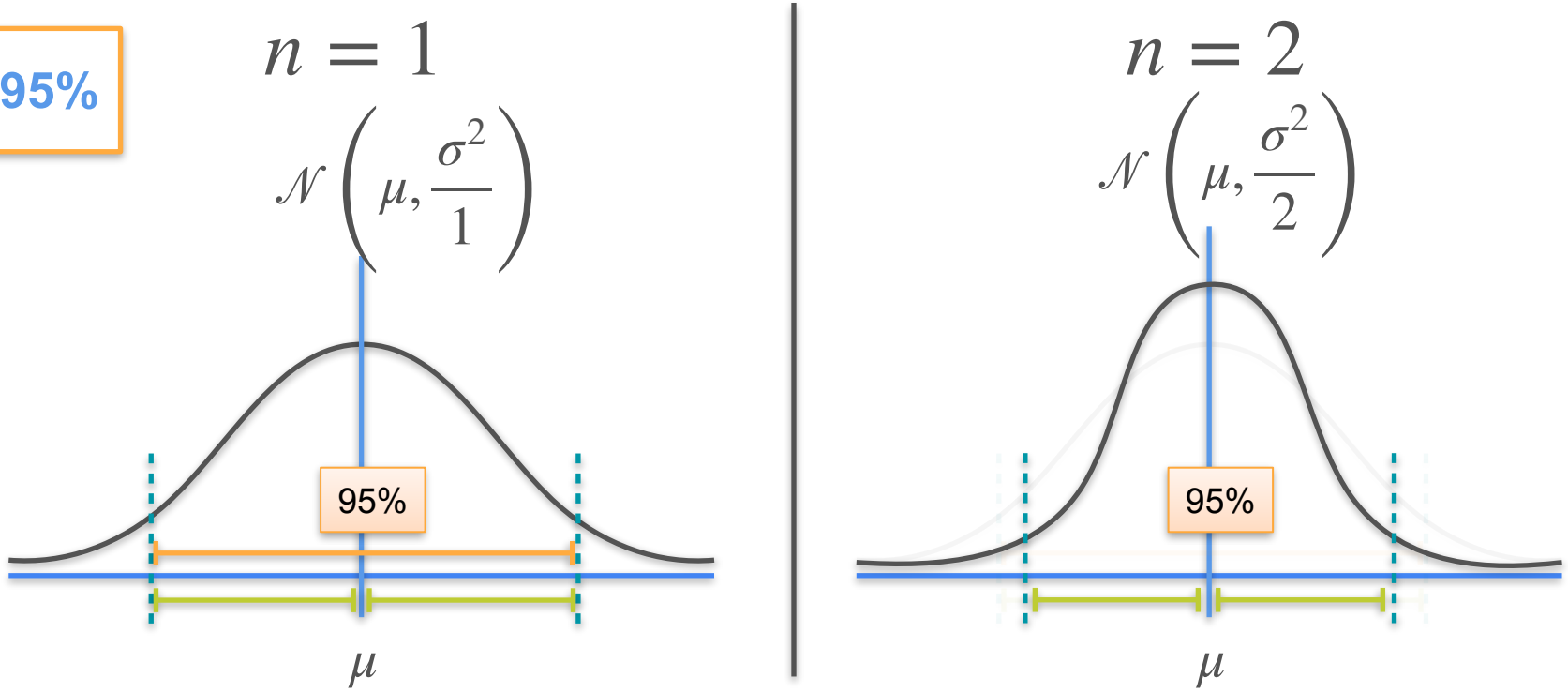
Confidence Interval - Intuition

95%



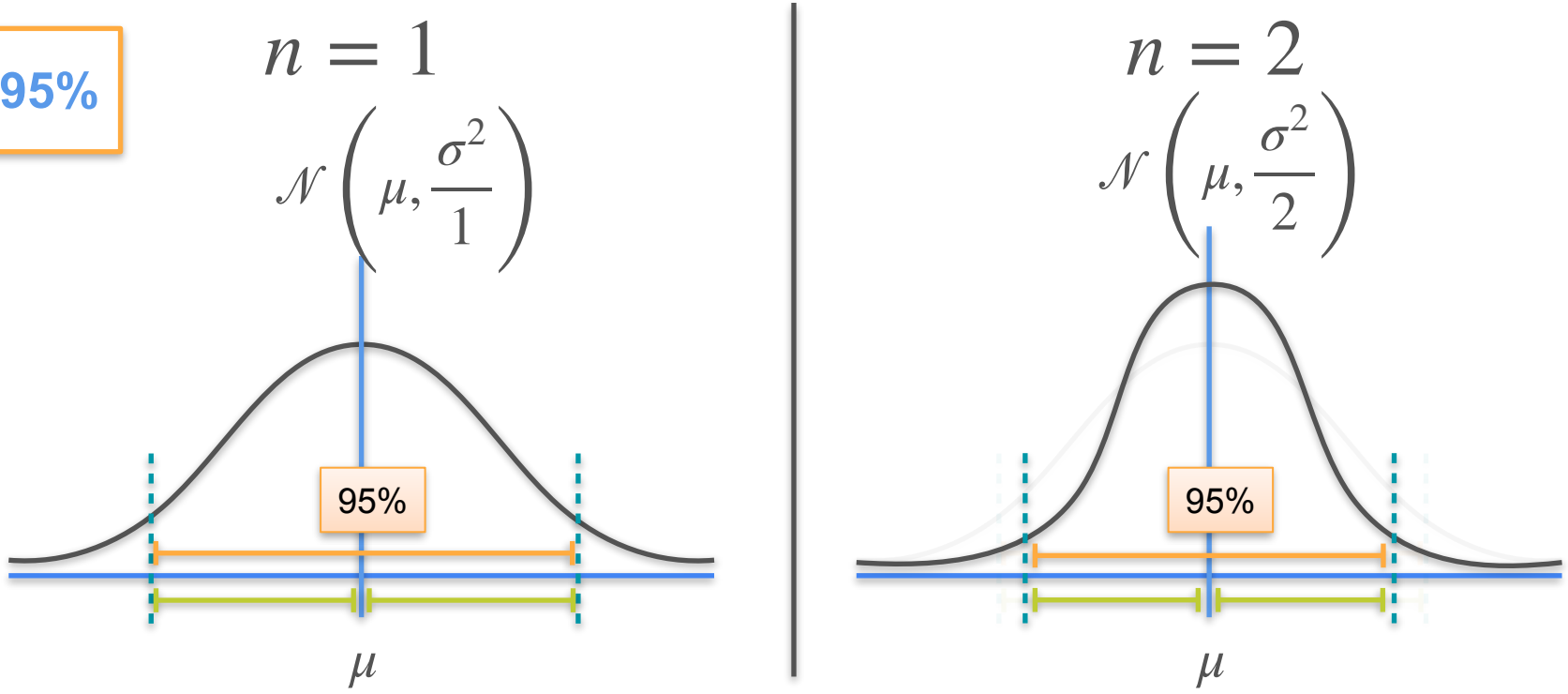
Confidence Interval - Intuition

95%



Confidence Interval - Intuition

95%

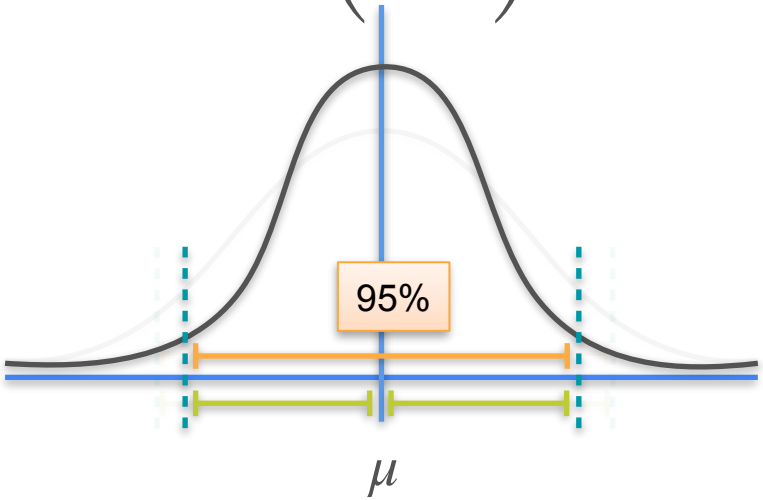


Confidence Interval - Intuition

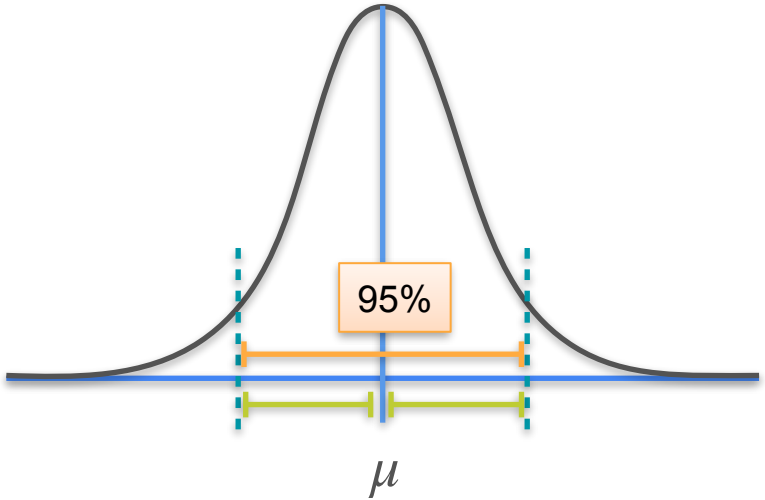
95%

$n = 2$

$$\mathcal{N}\left(\mu, \frac{\sigma^2}{2}\right)$$



$n = 10$

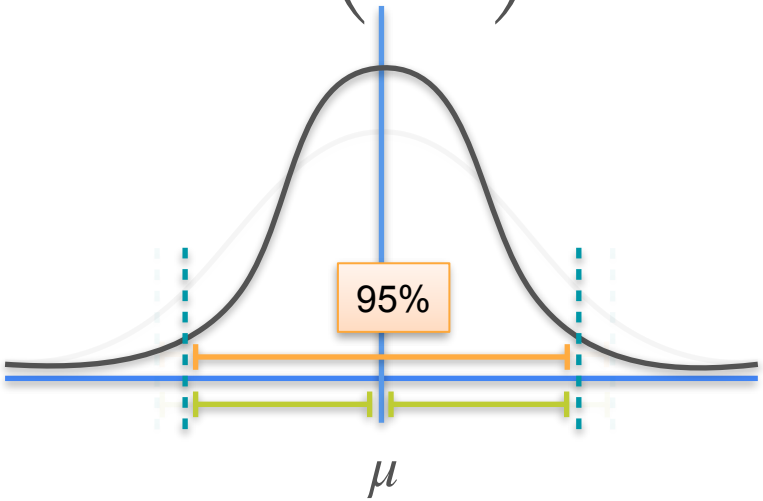


Confidence Interval - Intuition

95%

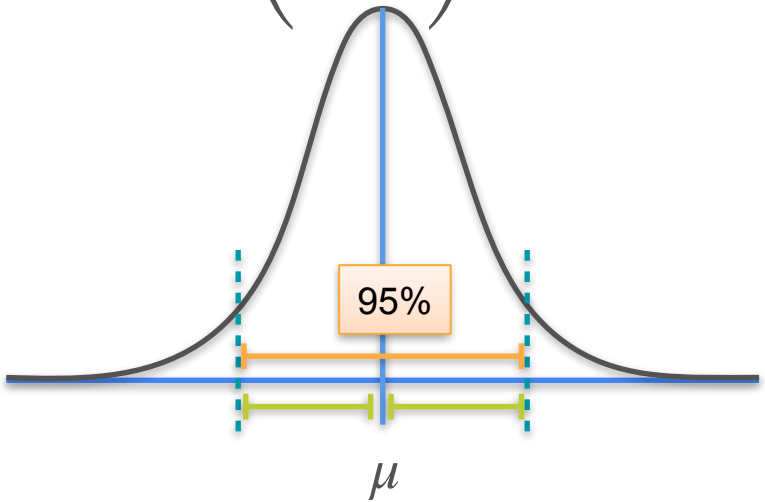
$n = 2$

$\mathcal{N}\left(\mu, \frac{\sigma^2}{2}\right)$



$n = 10$

$\mathcal{N}\left(\mu, \frac{\sigma^2}{10}\right)$

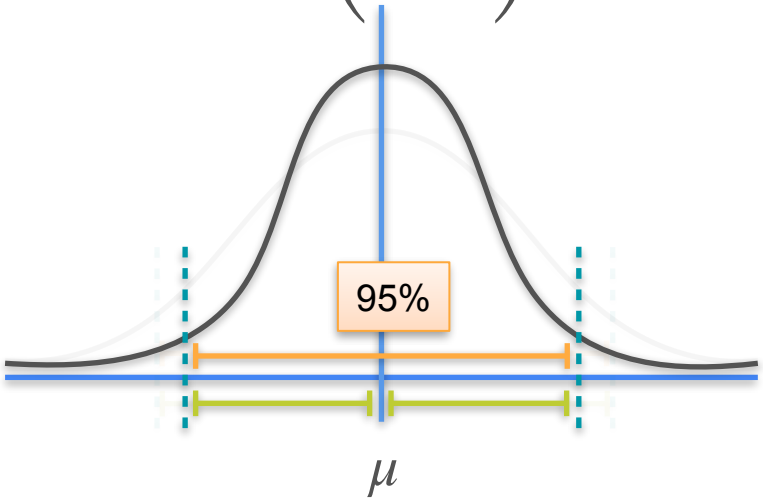


Confidence Interval - Intuition

95%

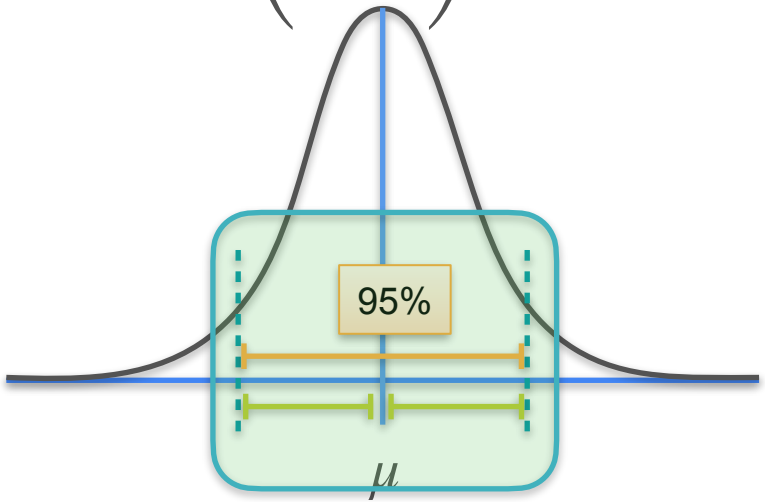
$n = 2$

$\mathcal{N}\left(\mu, \frac{\sigma^2}{2}\right)$

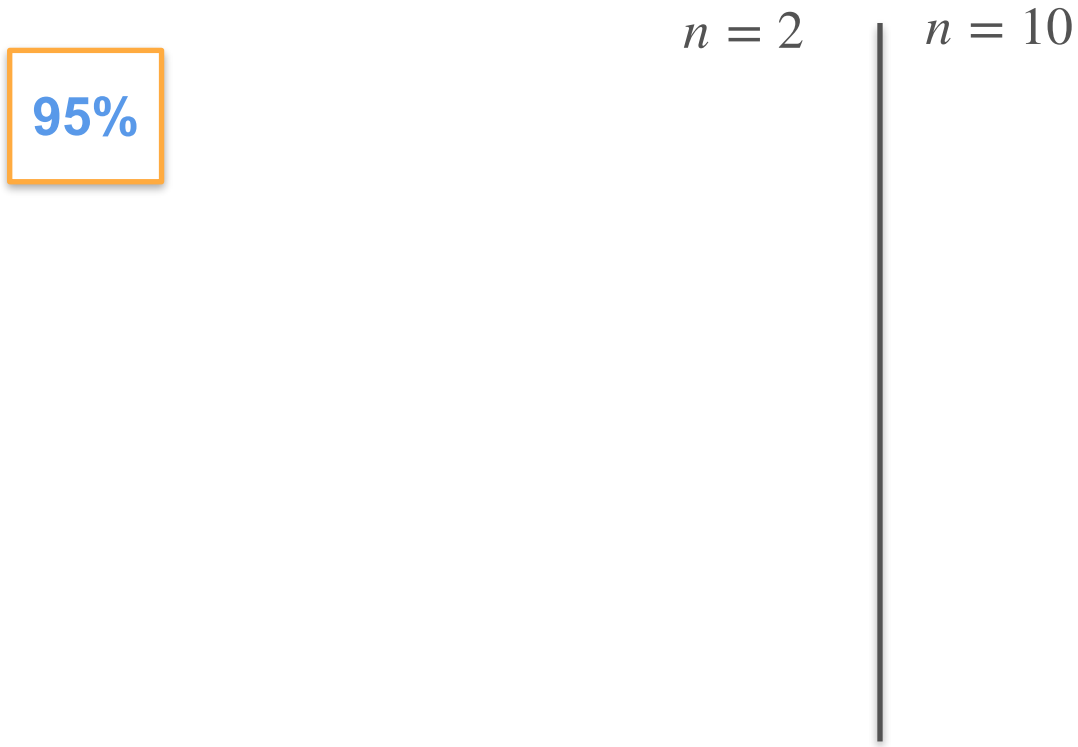


$n = 10$

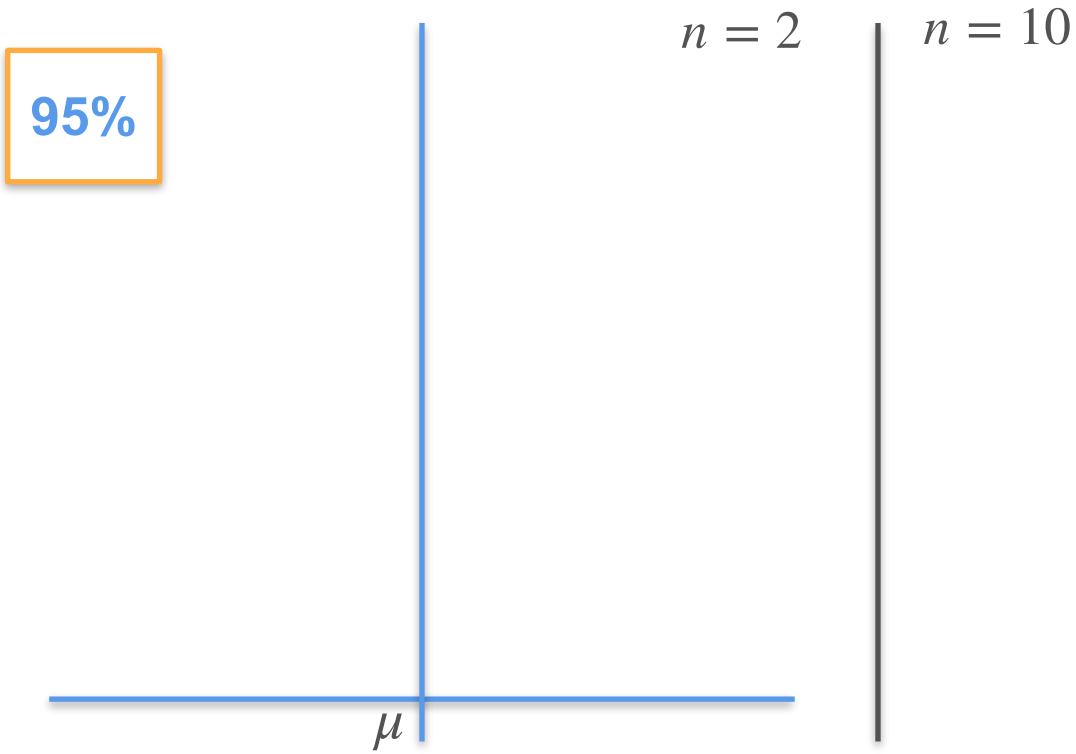
$\mathcal{N}\left(\mu, \frac{\sigma^2}{10}\right)$



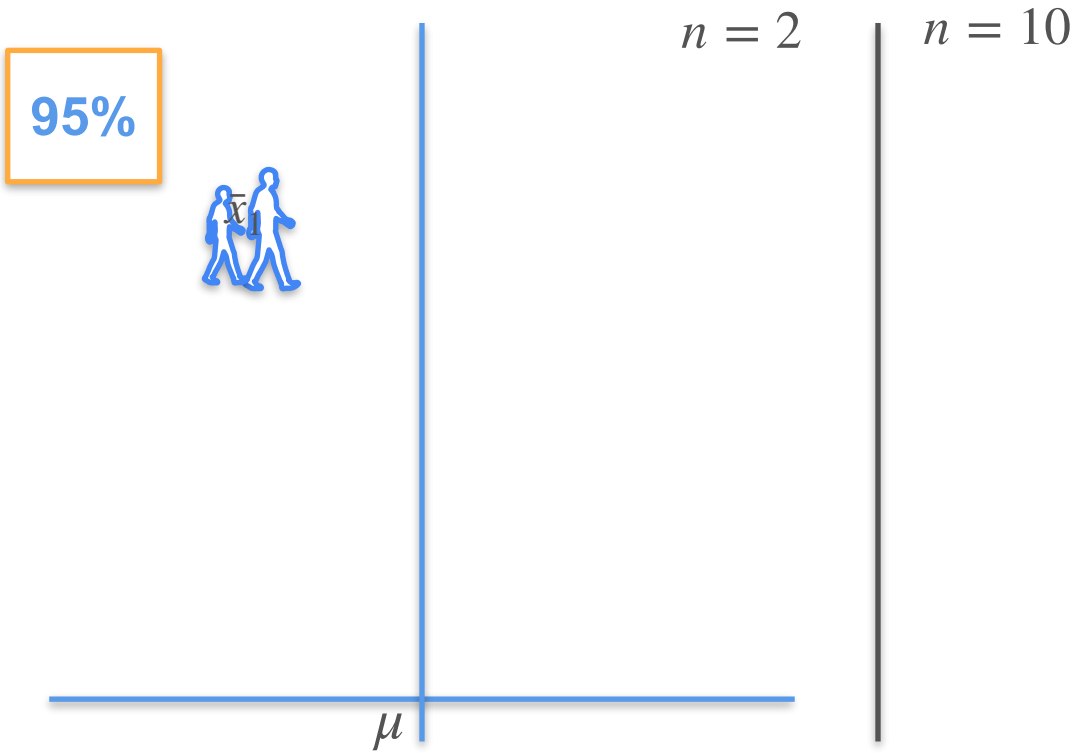
Confidence Interval - Intuition



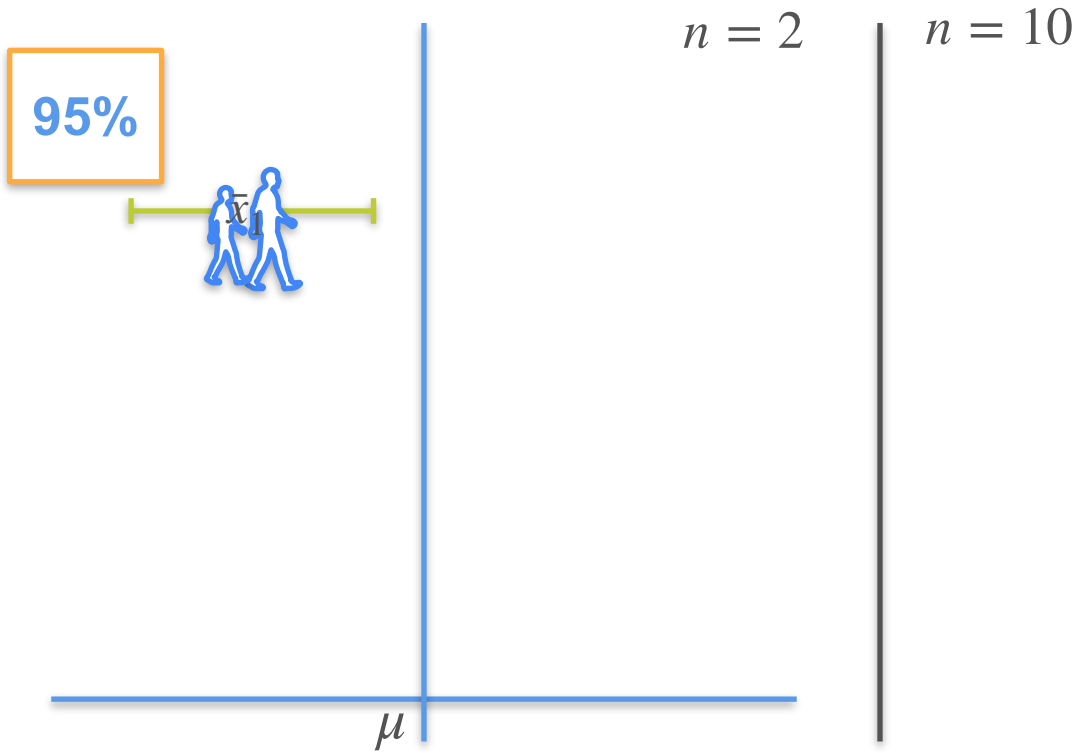
Confidence Interval - Intuition



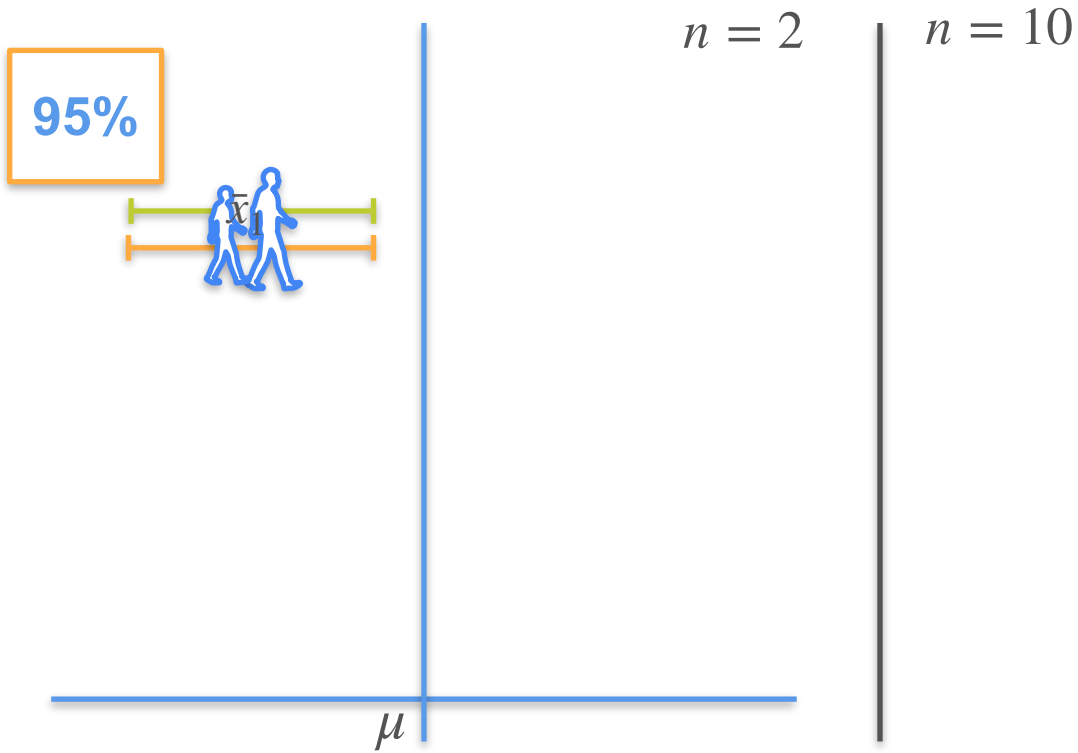
Confidence Interval - Intuition



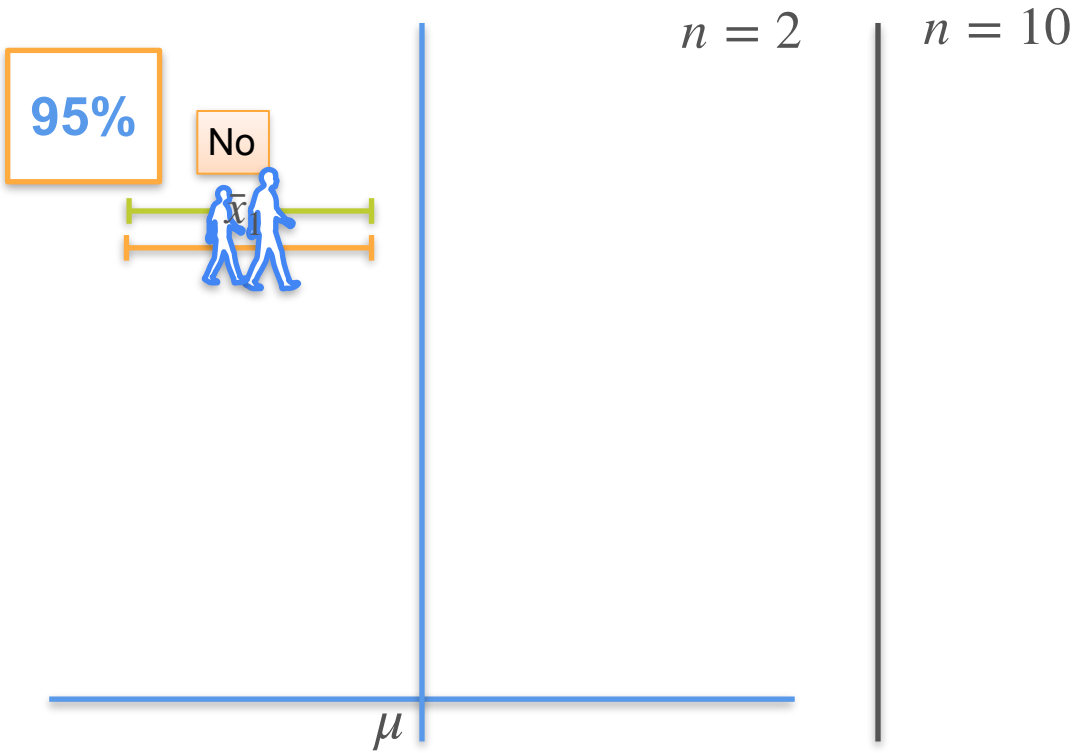
Confidence Interval - Intuition



Confidence Interval - Intuition



Confidence Interval - Intuition



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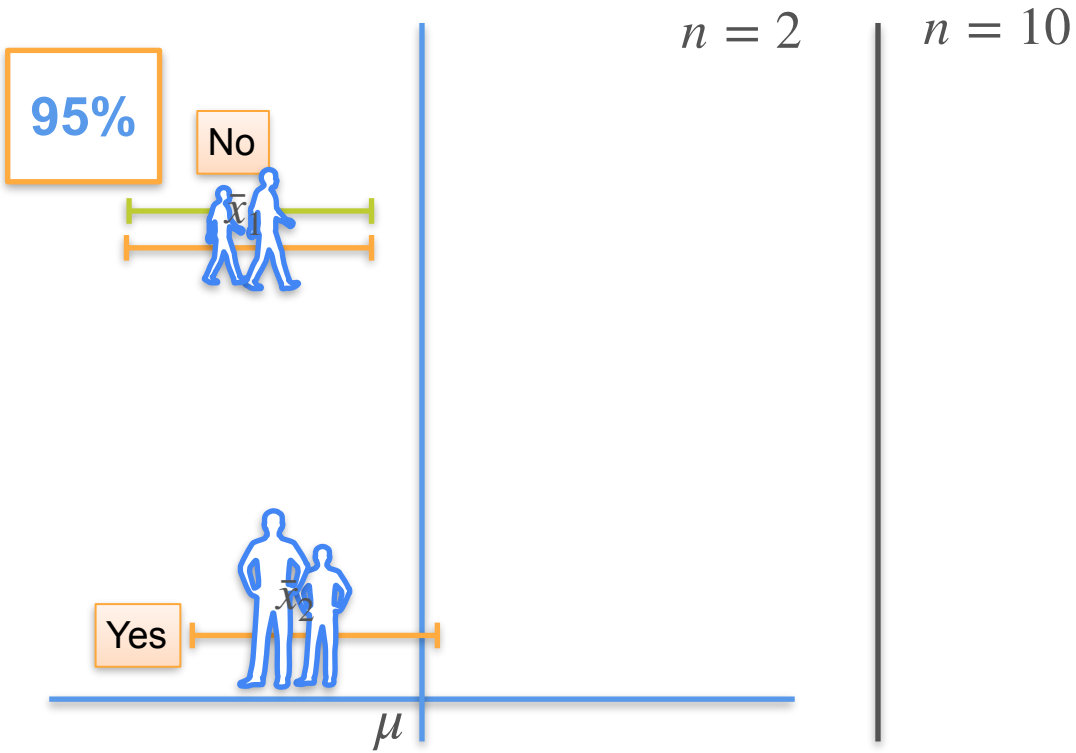

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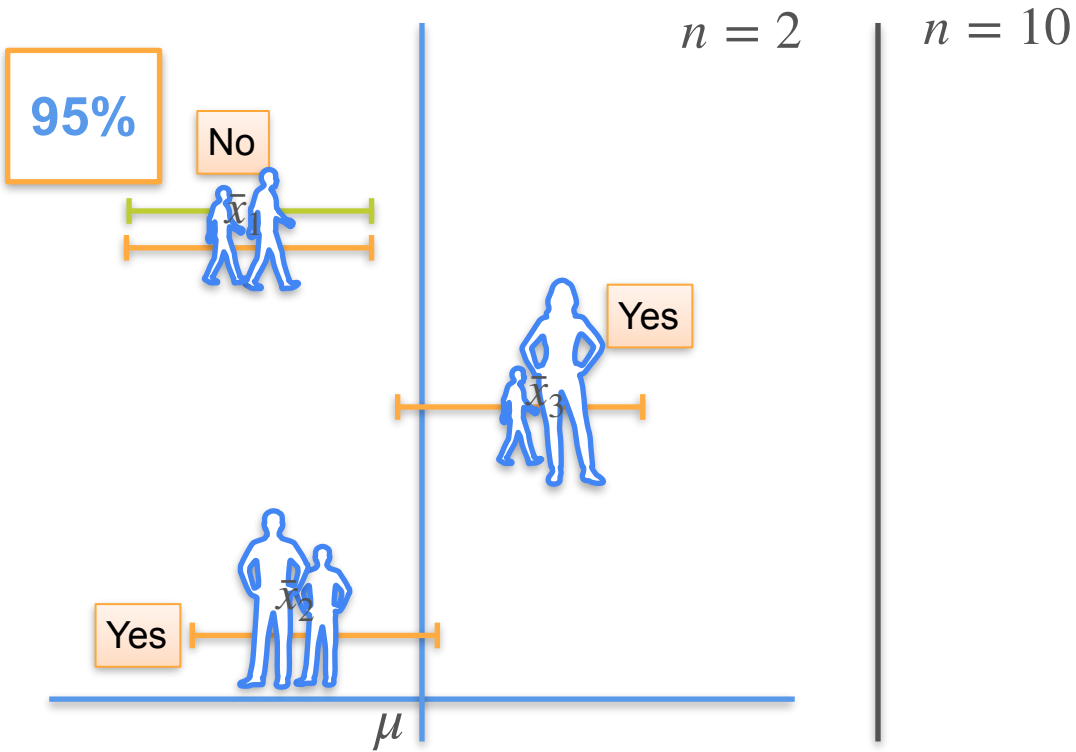

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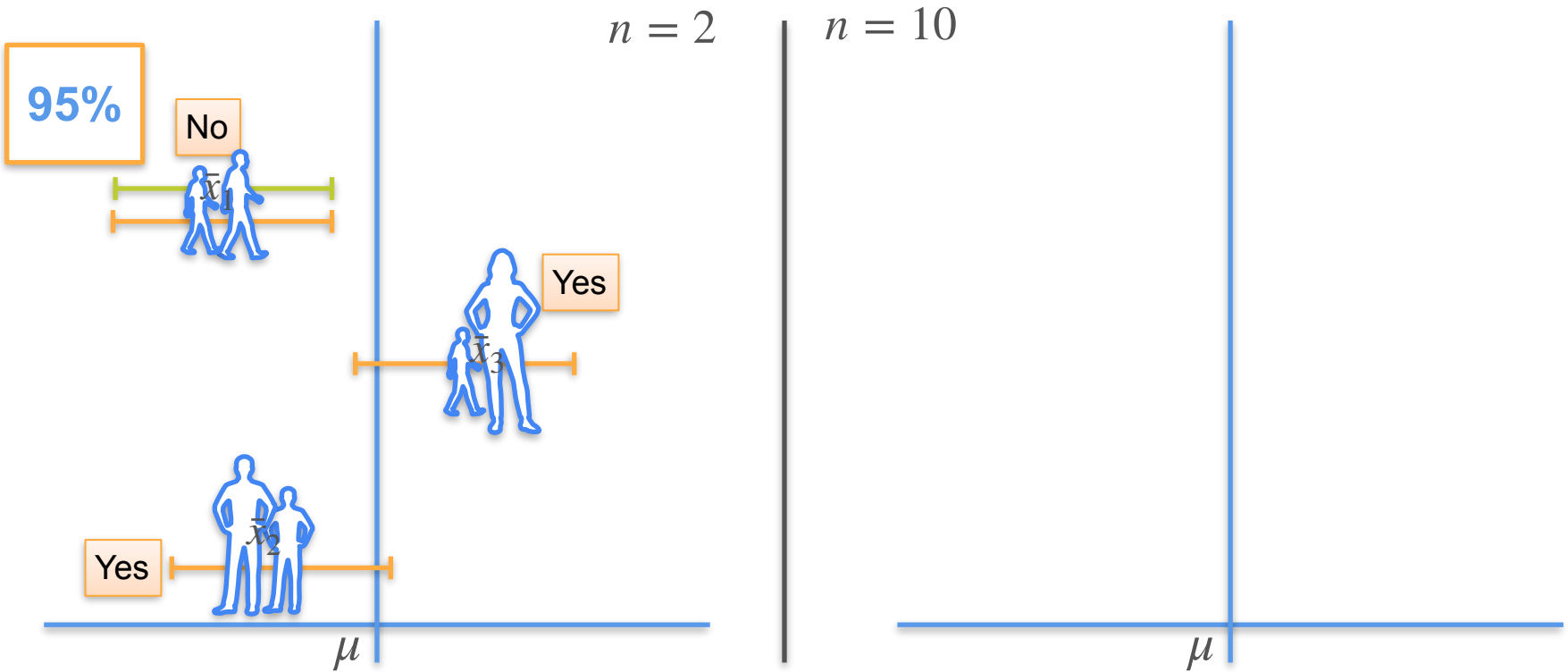

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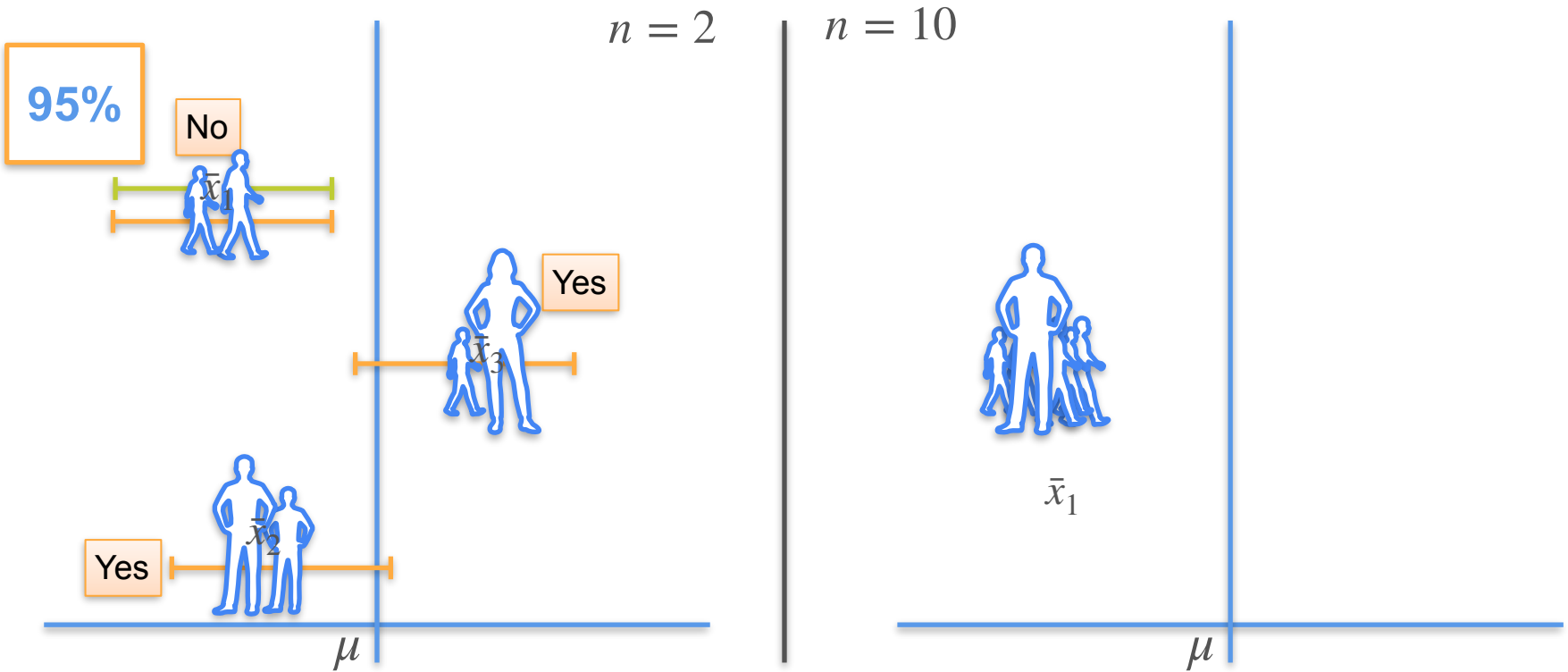

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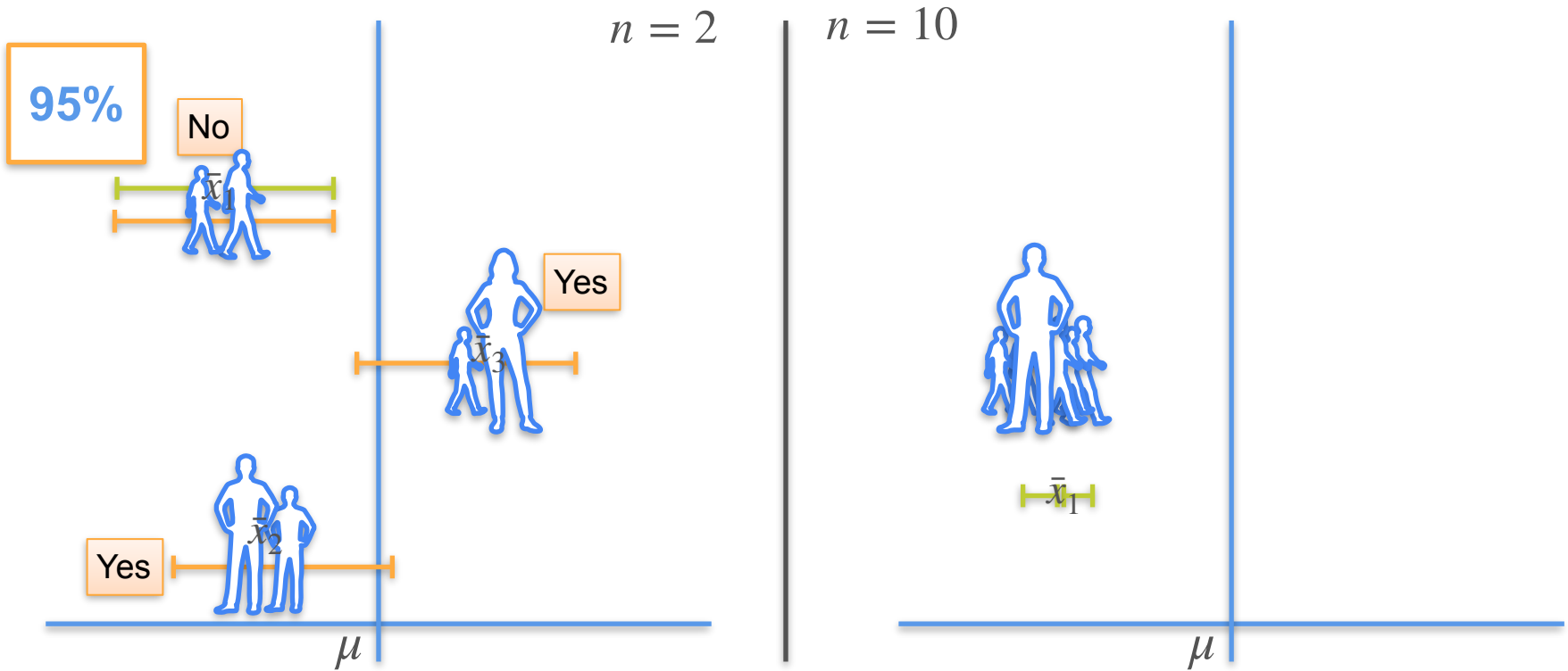

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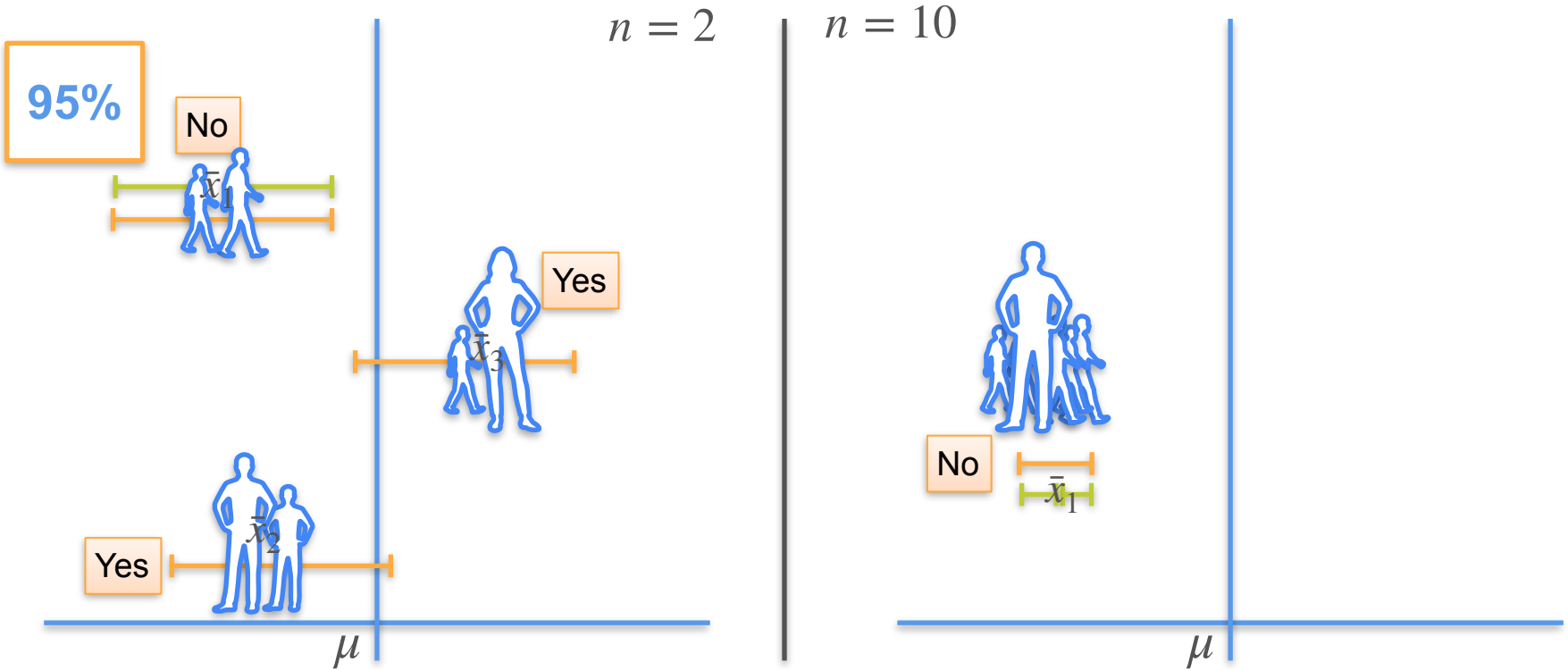

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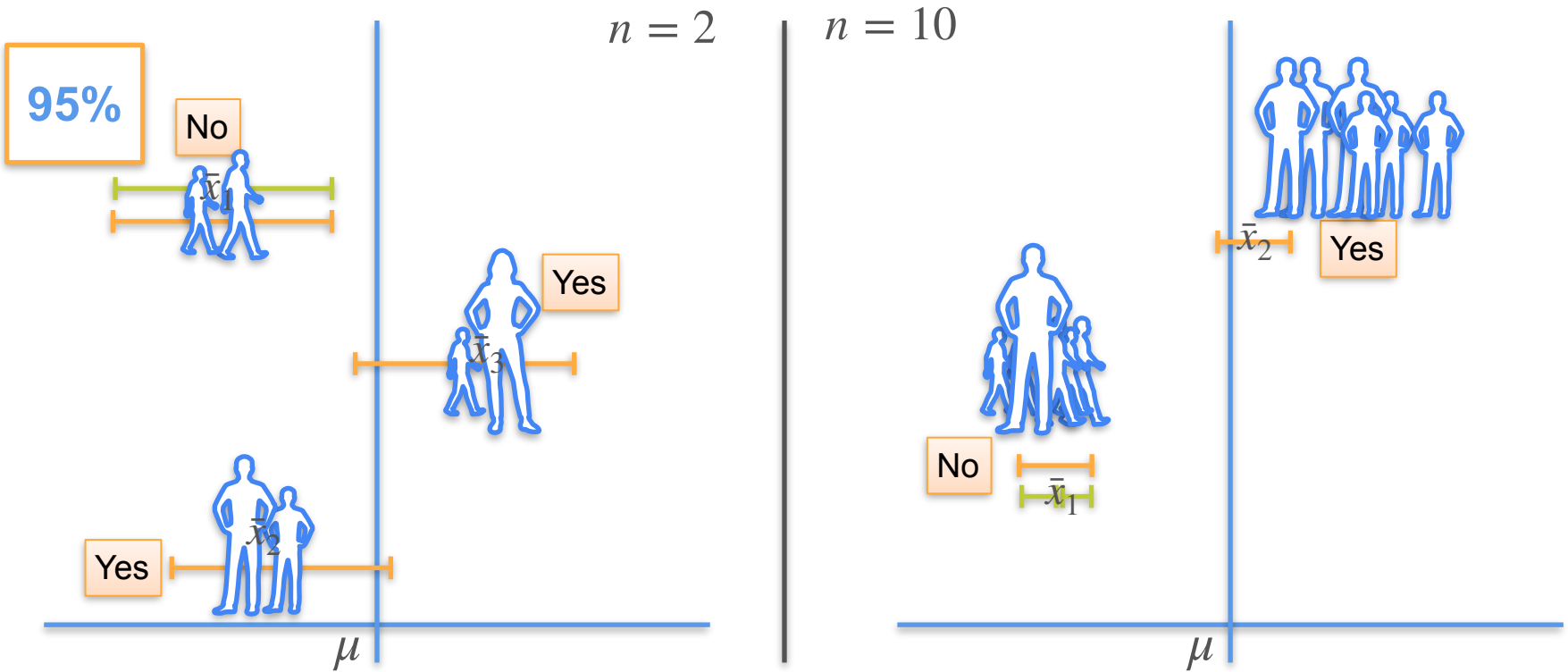

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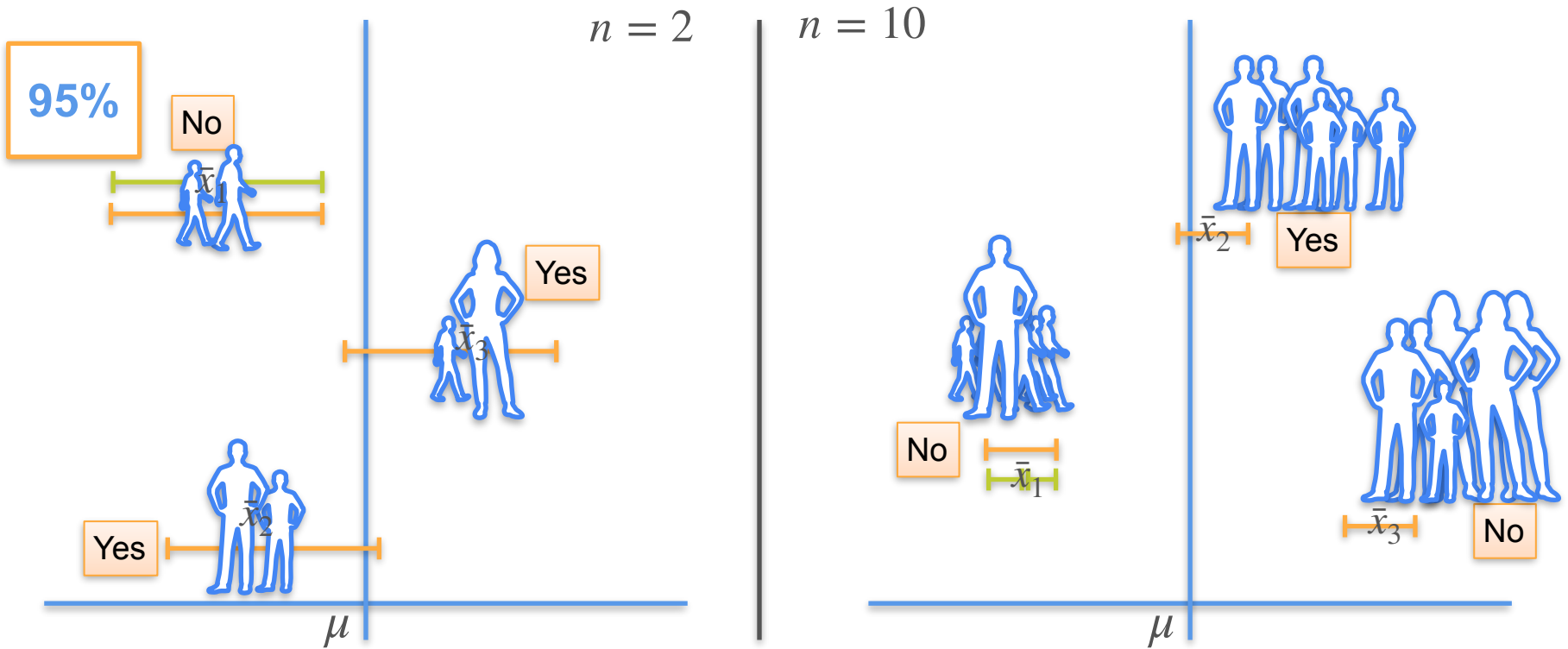

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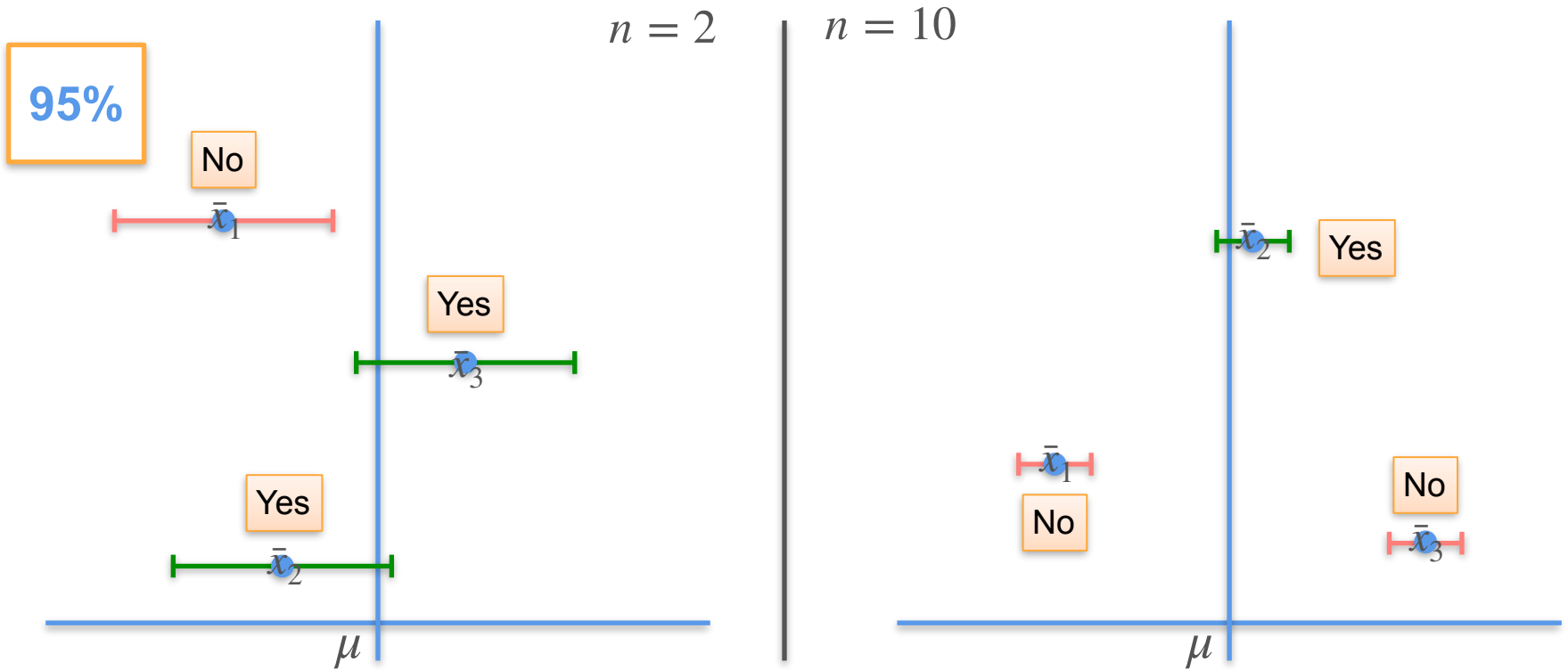

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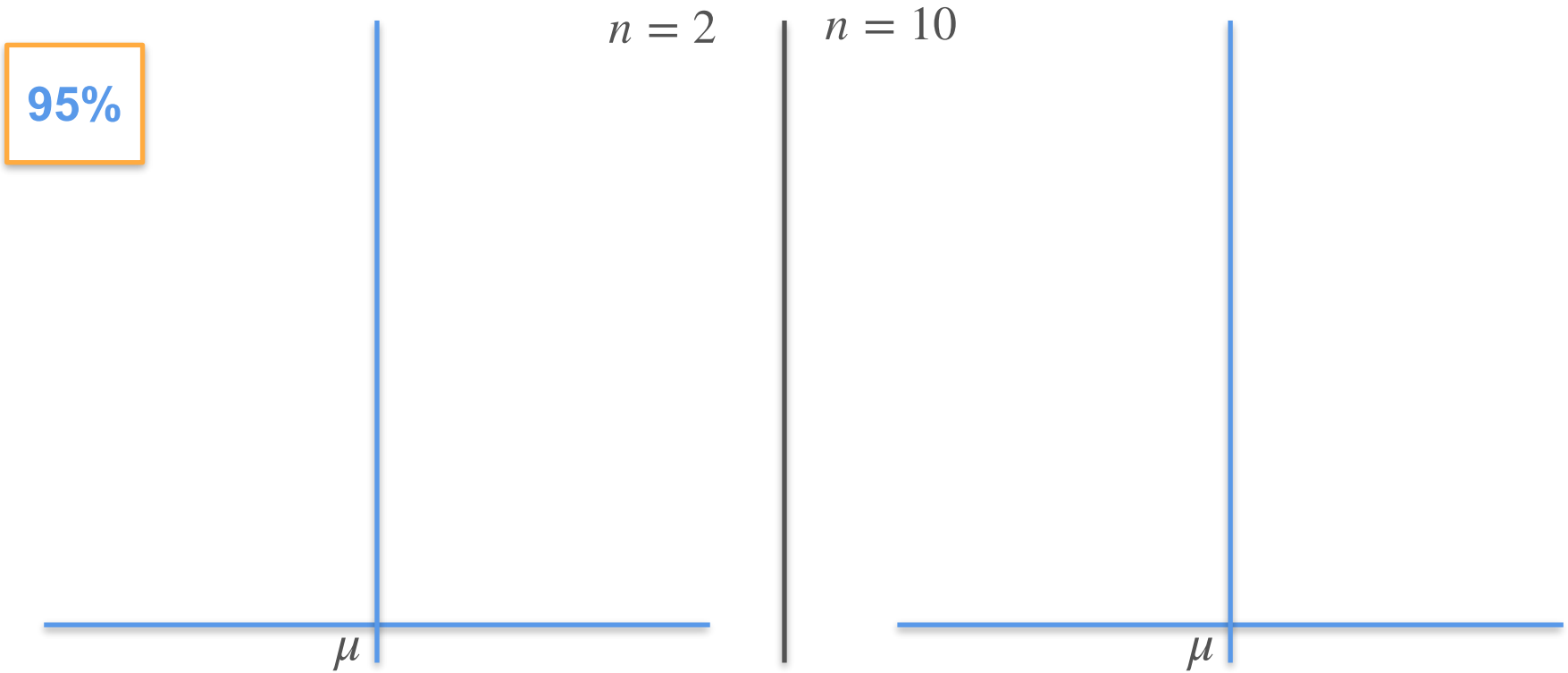

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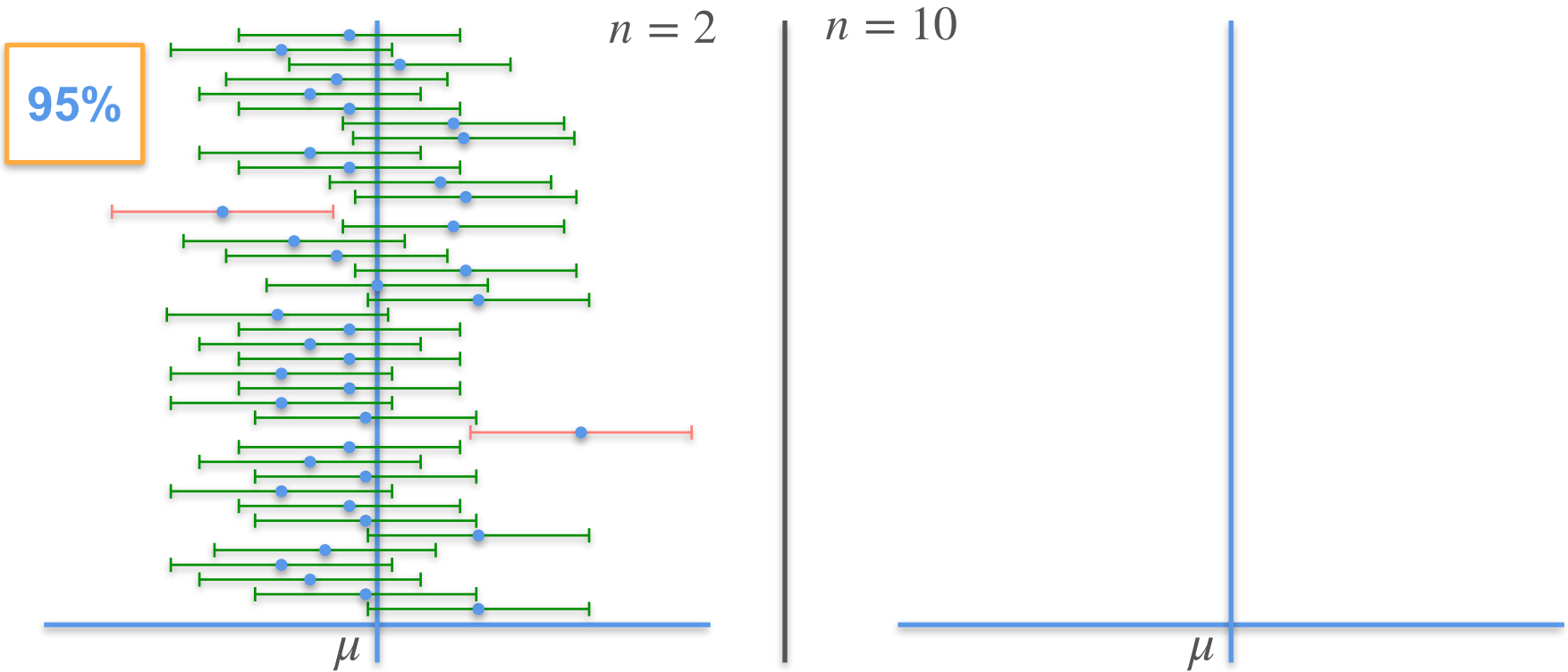

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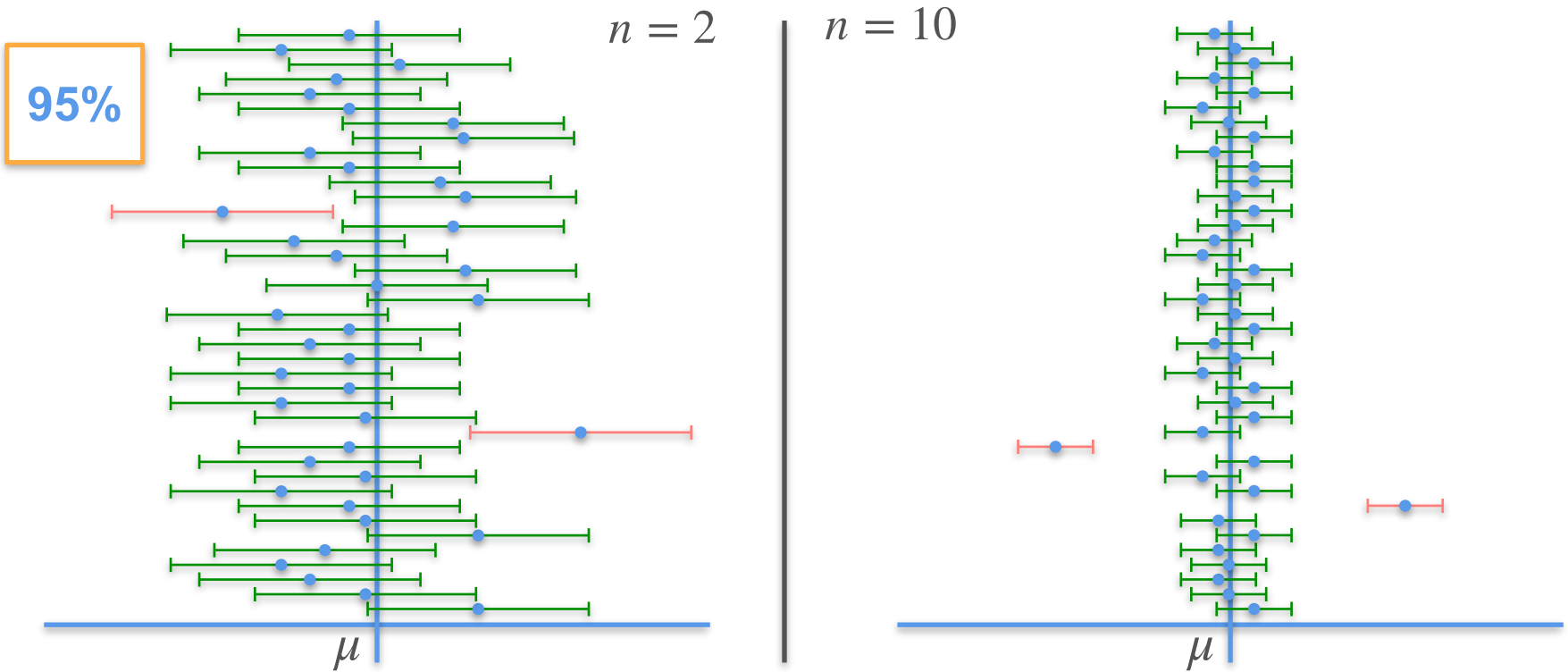

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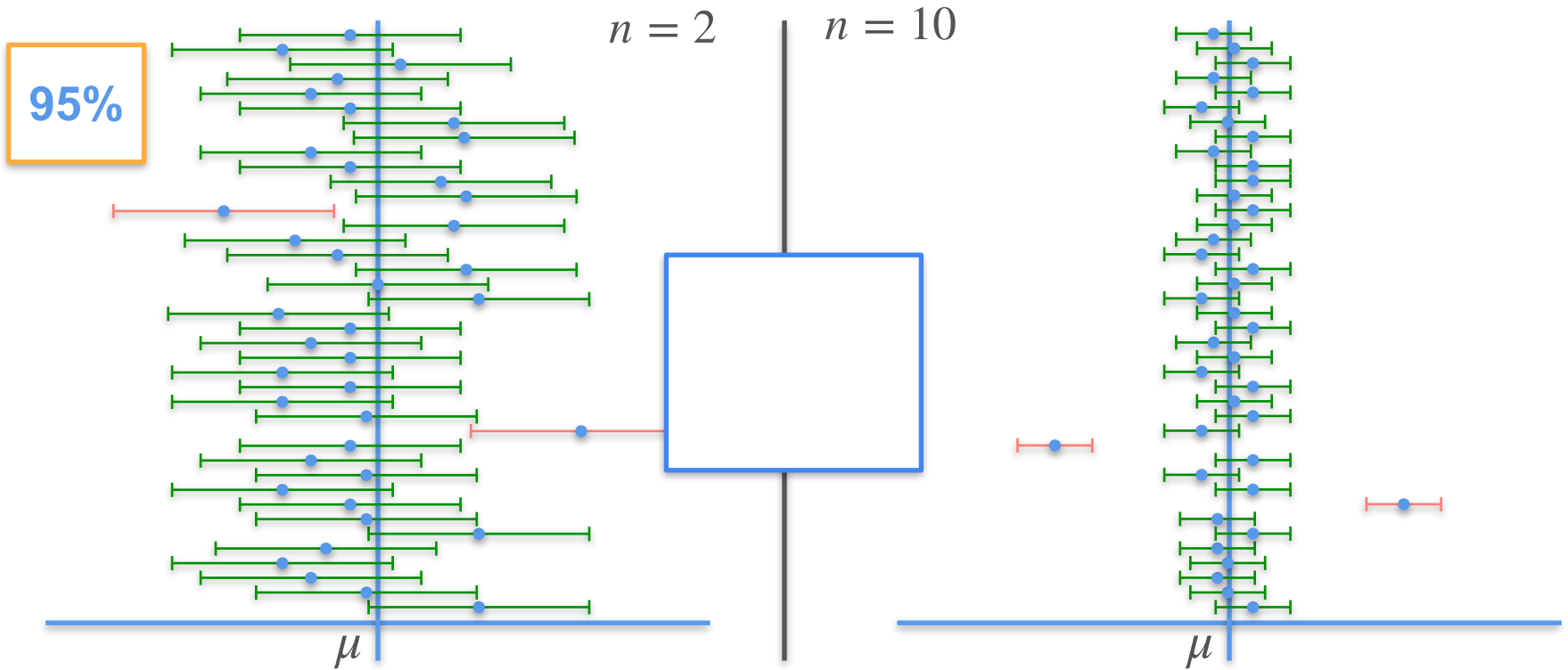

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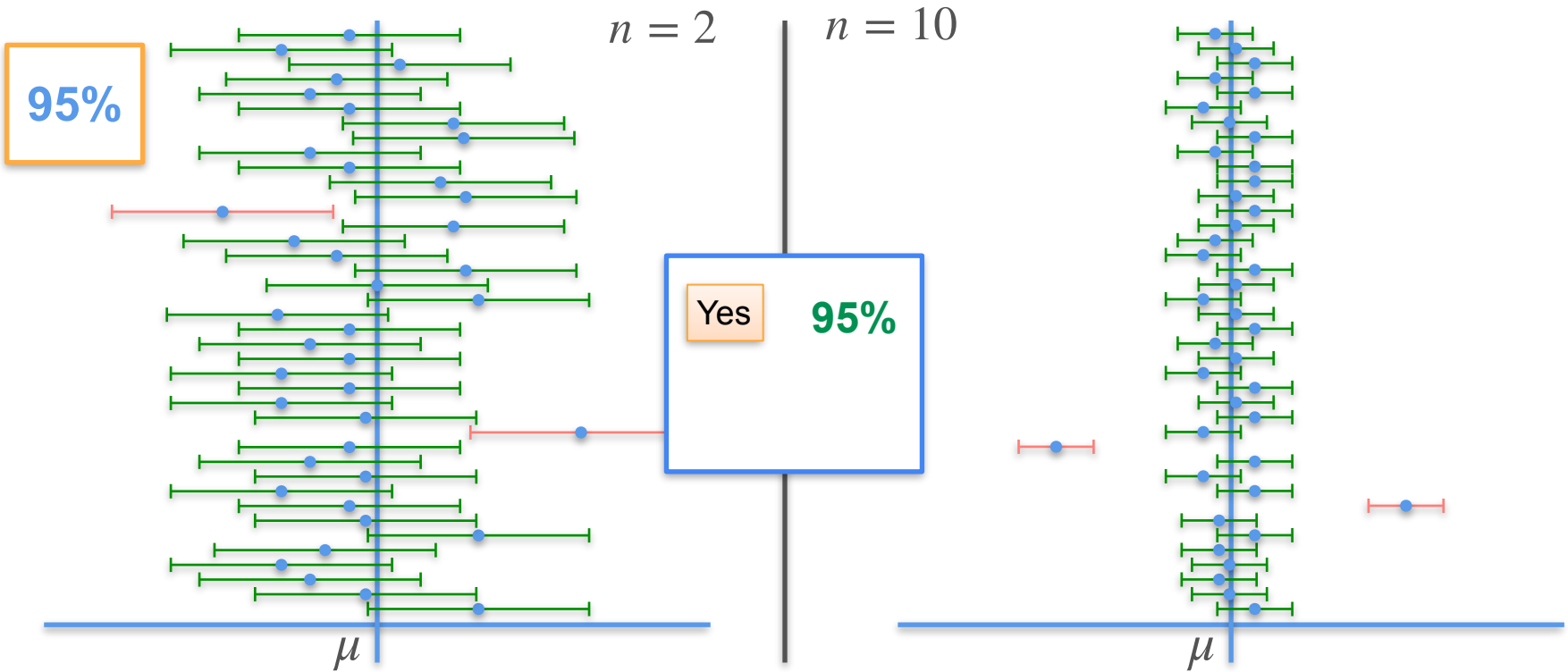

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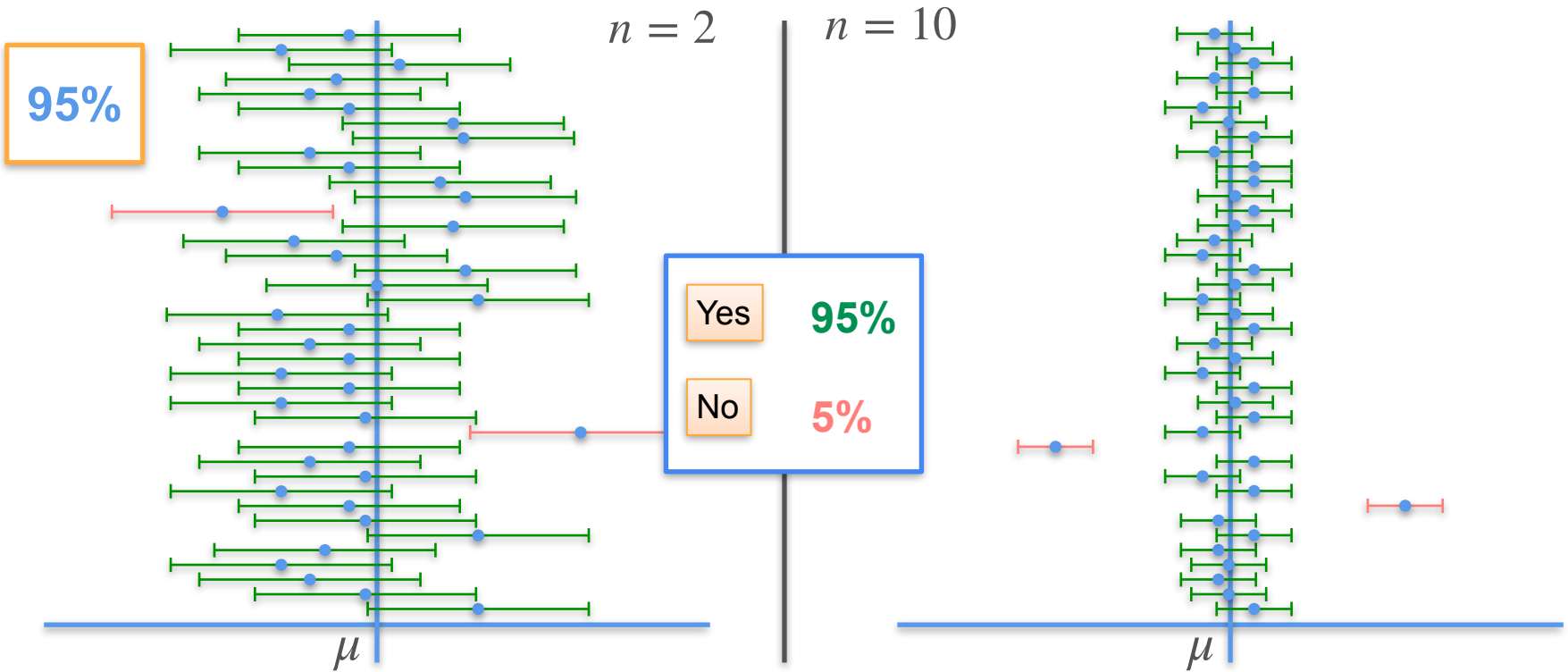
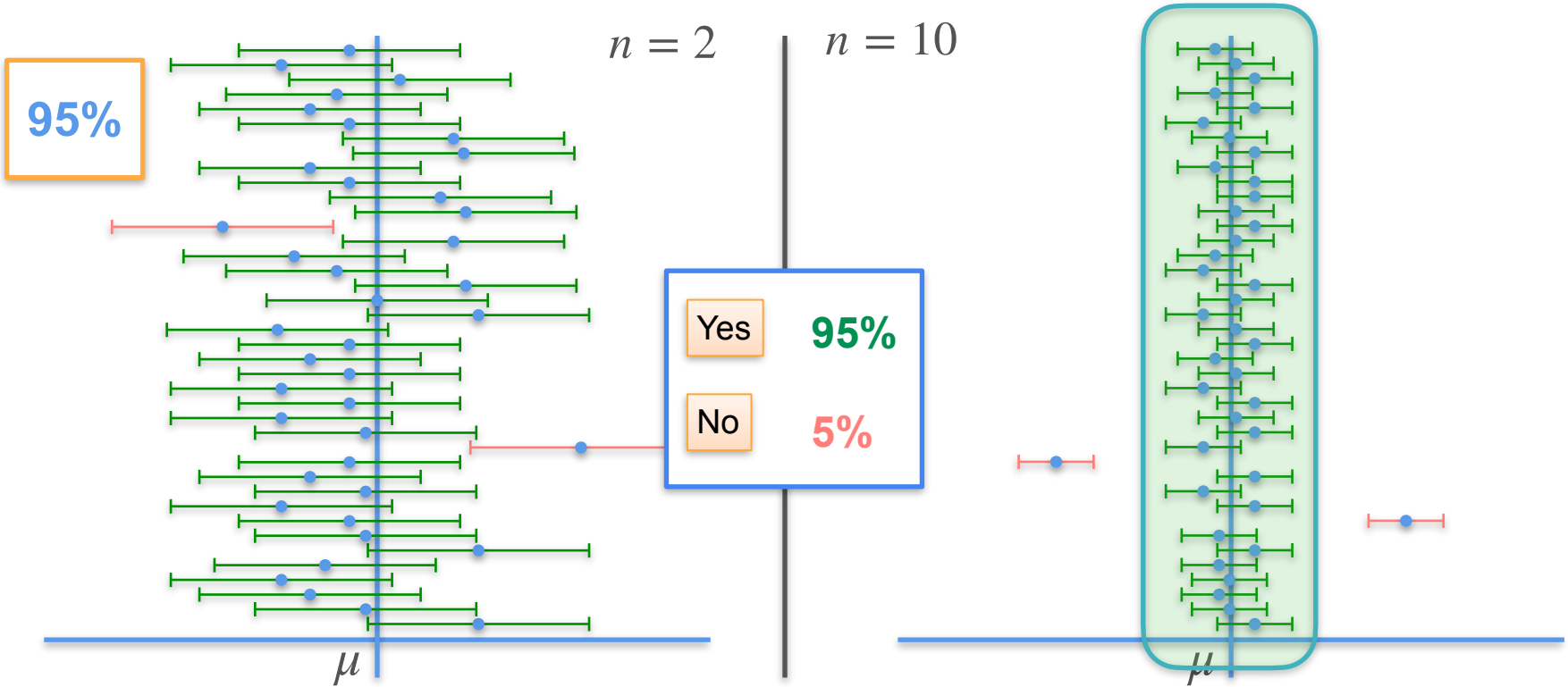
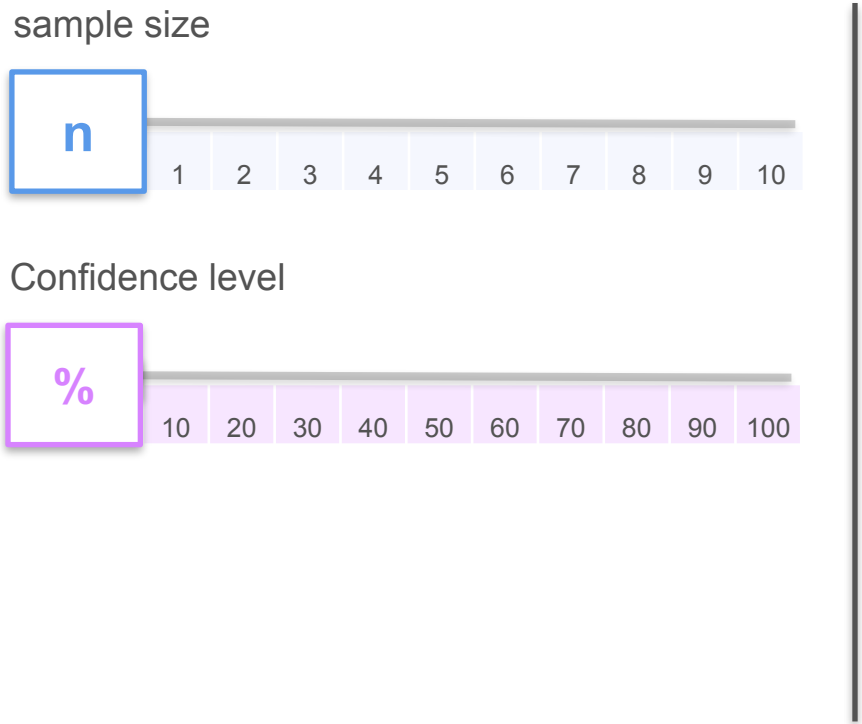


Confidence Interval - Intuition



Effect of the Sample Size

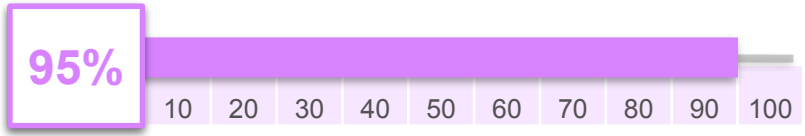
Effect of the Sample Size

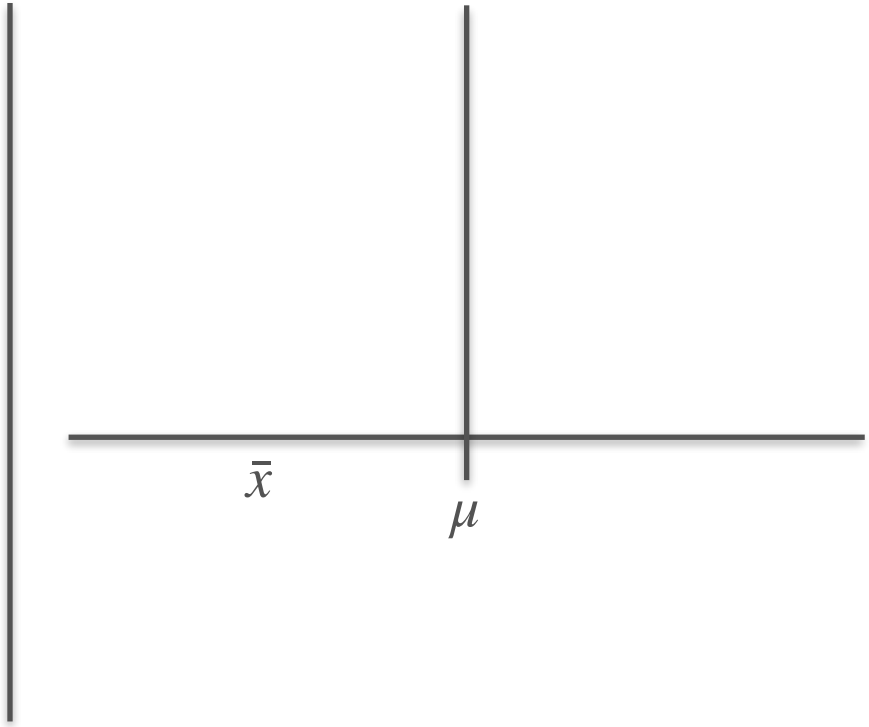


Effect of the Sample Size

sample size

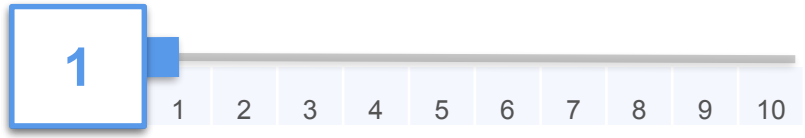
Confidence level



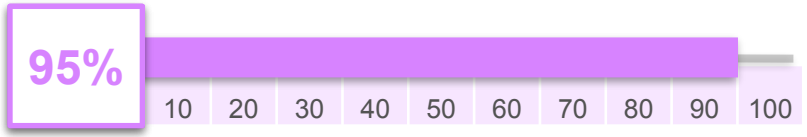


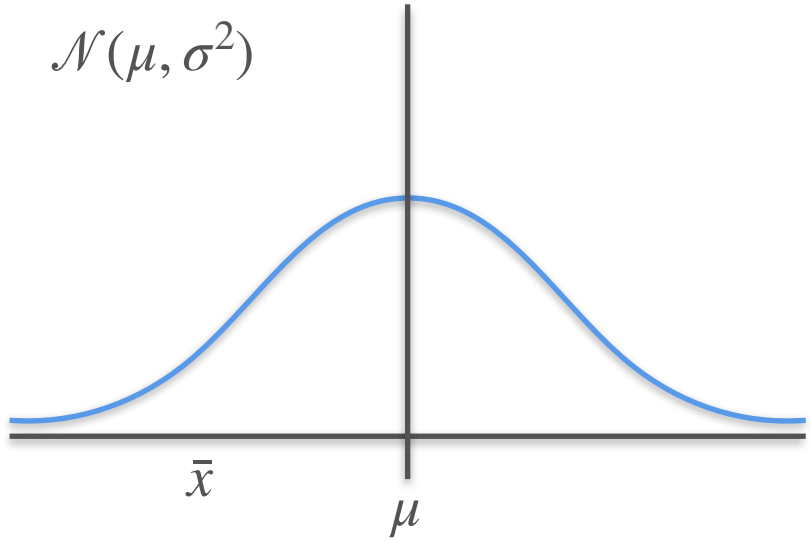
Effect of the Sample Size

sample size



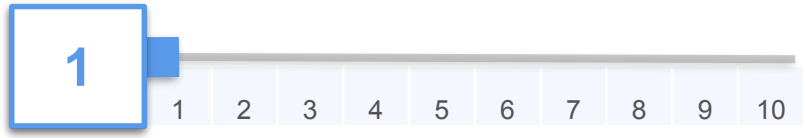
Confidence level



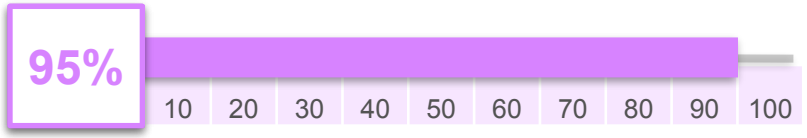


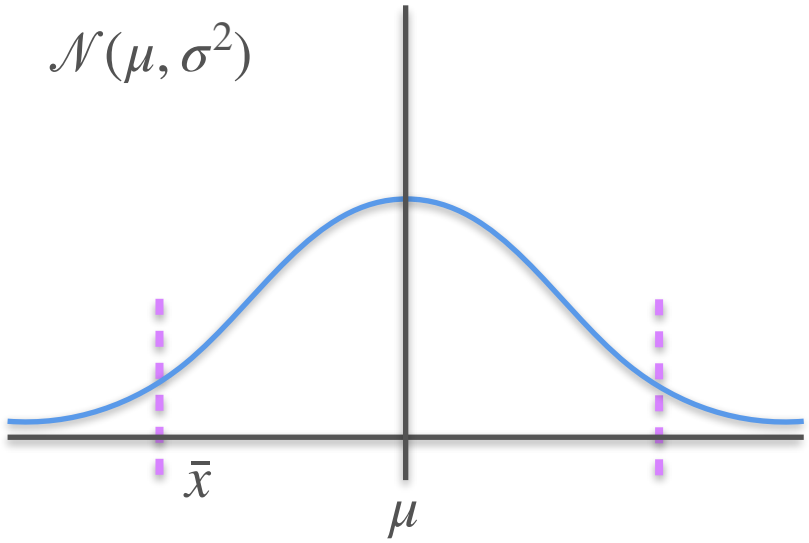
Effect of the Sample Size

sample size



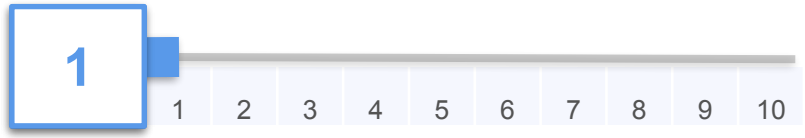
Confidence level



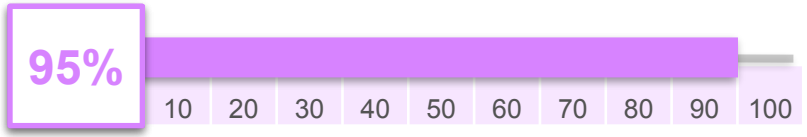


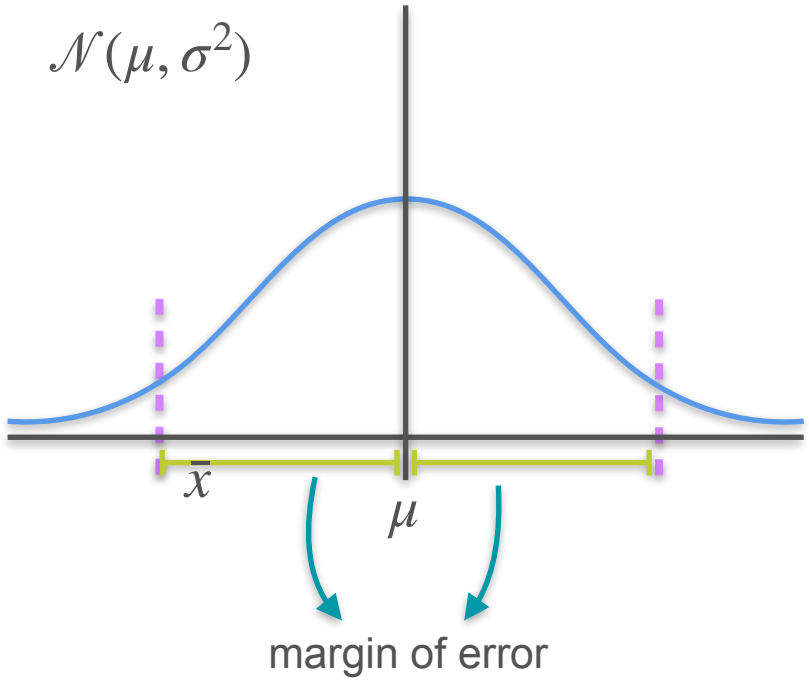
Effect of the Sample Size

sample size



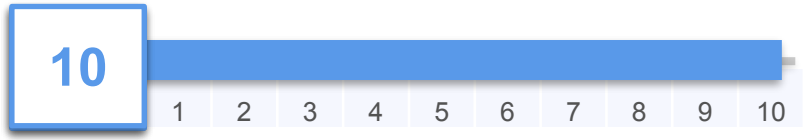
Confidence level



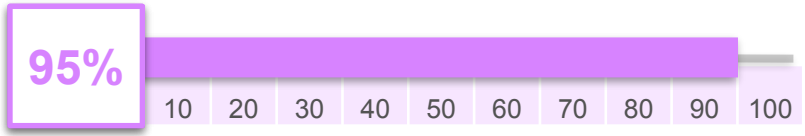


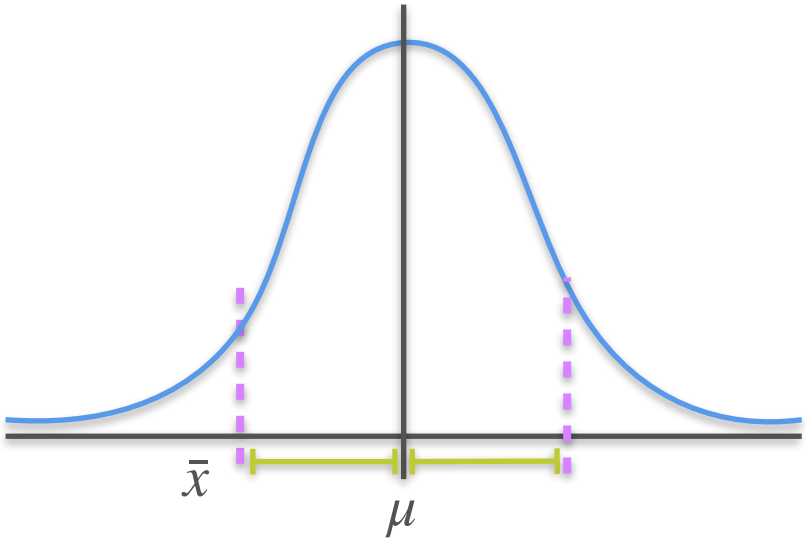
Effect of the Sample Size

sample size



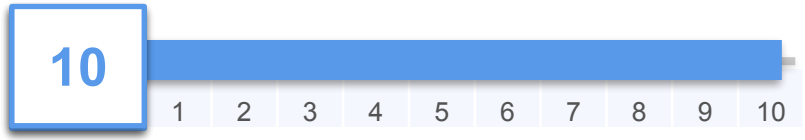
Confidence level



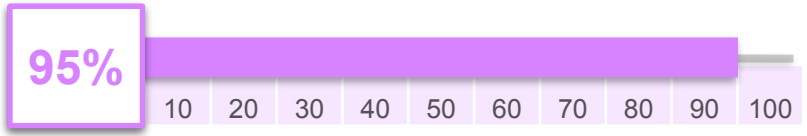


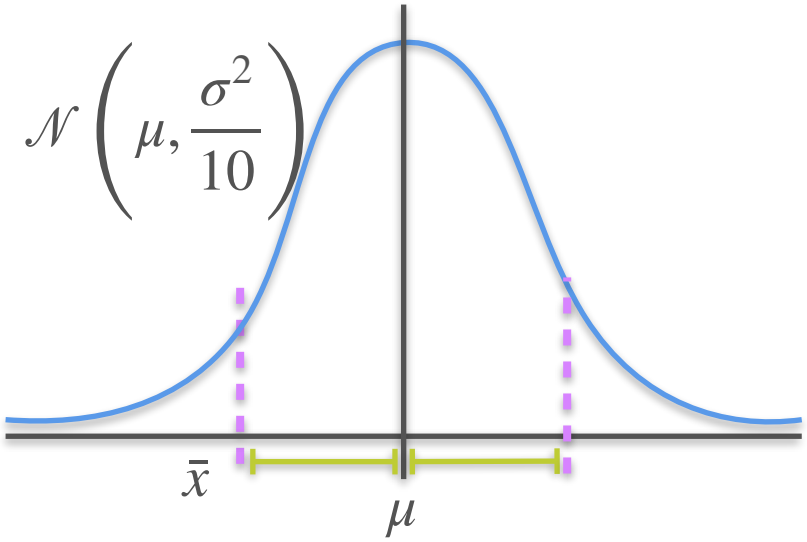
Effect of the Sample Size

sample size



Confidence level

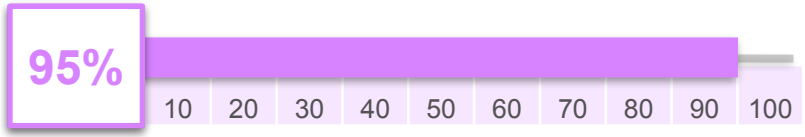


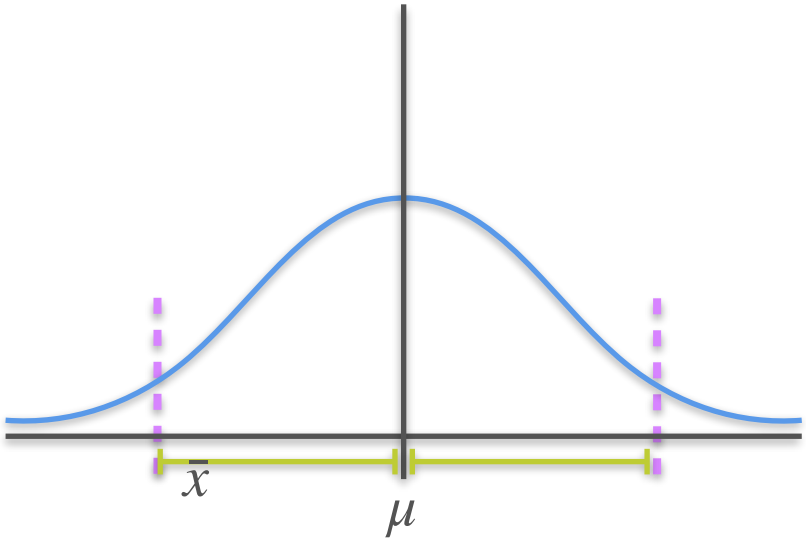


Effect of the Sample Size

sample size

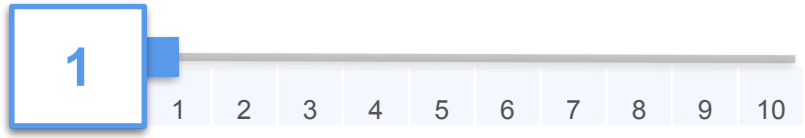
Confidence level



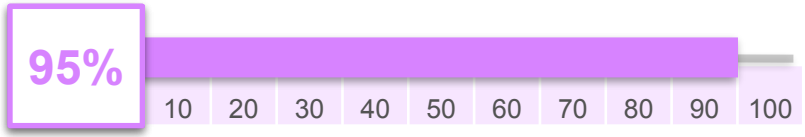


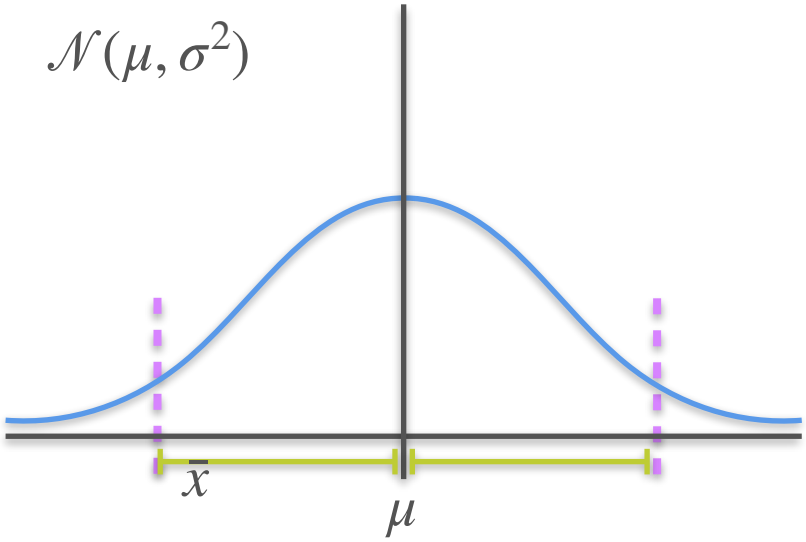
Effect of the Sample Size

sample size



Confidence level





Effect of the Sample Size

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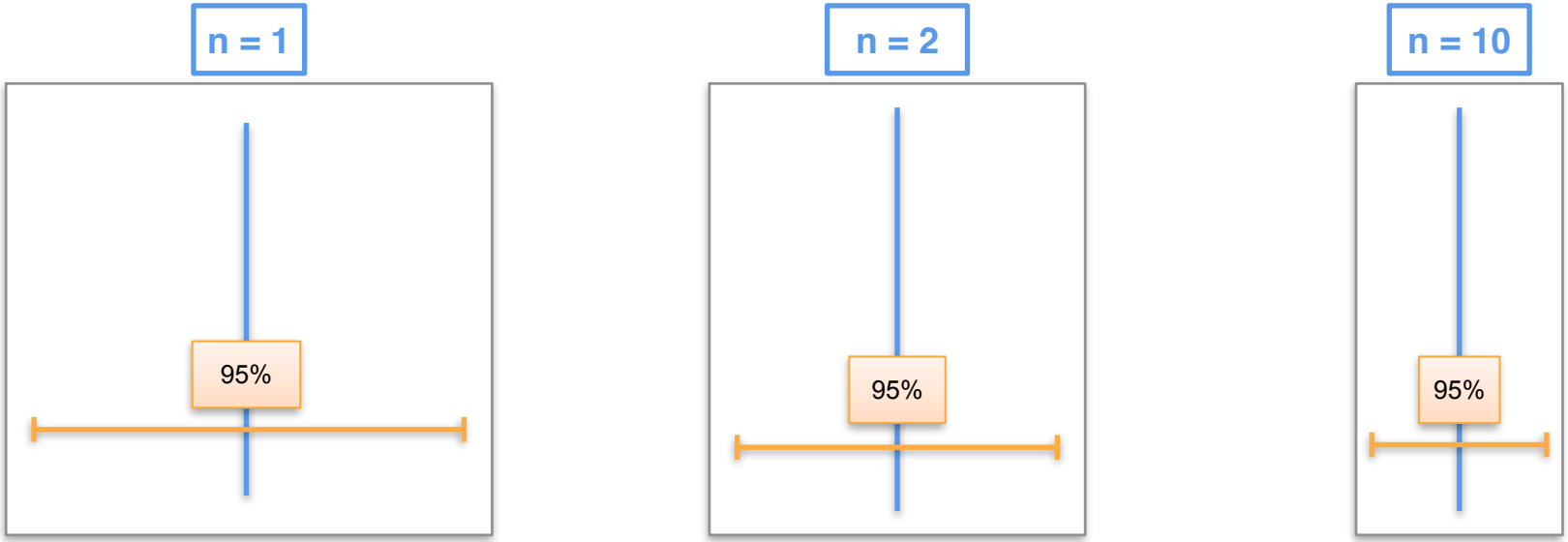
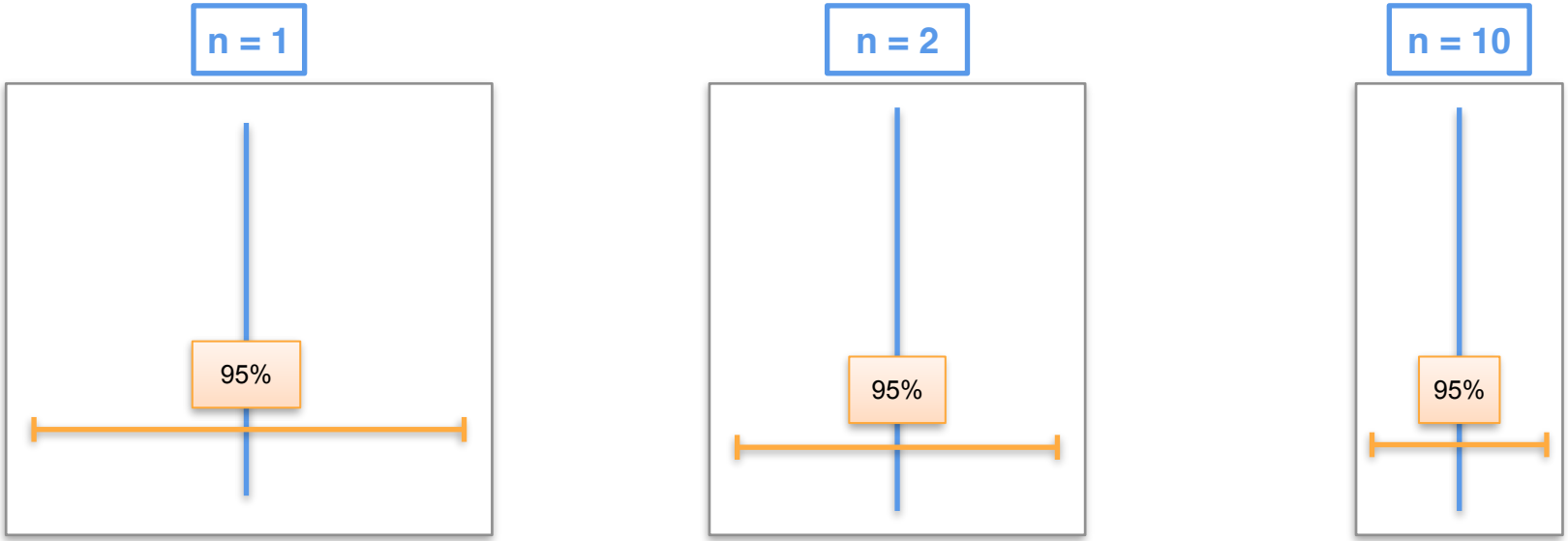


Effect of the Sample Size



As n increases, the confidence interval shrinks

Effect of the Confidence Level

Effect of the Confidence Level

$n = 1$

Effect of the Confidence Level

$n = 1$

$\mathcal{N}(\mu, \sigma^2)$

Effect of the Confidence Level

$n = 1$

$\mathcal{N}(\mu, \sigma^2)$

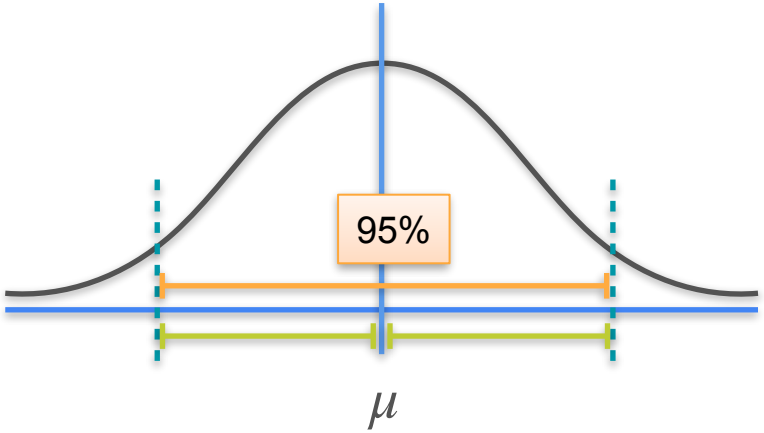
95%

Effect of the Confidence Level

$n = 1$

95%

$\mathcal{N}(\mu, \sigma^2)$

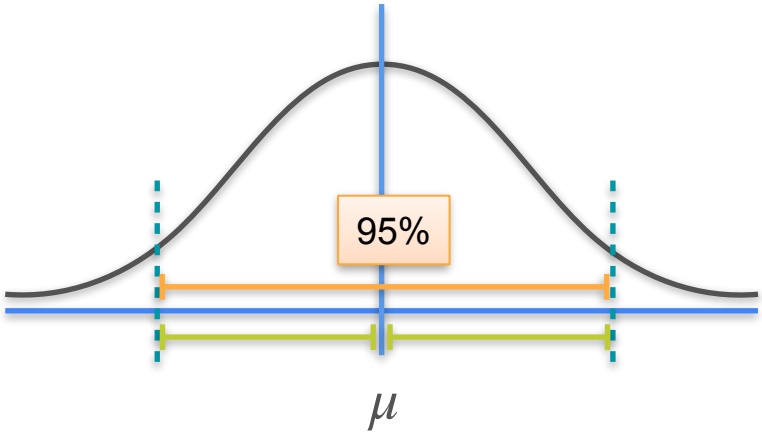


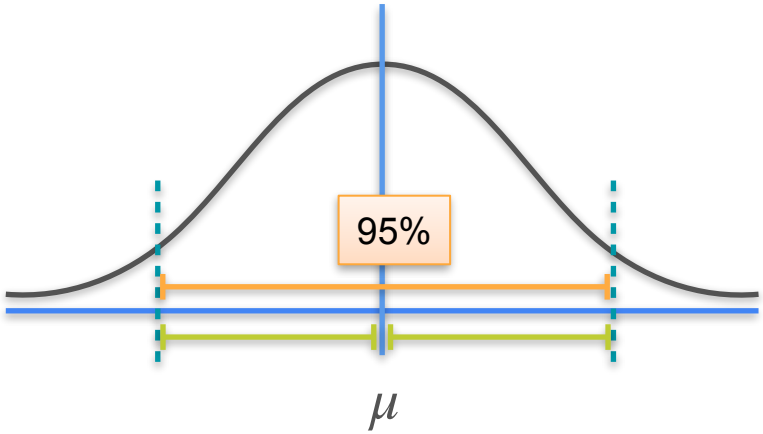
Effect of the Confidence Level

$n = 1$

95%

$\mathcal{N}(\mu, \sigma^2)$



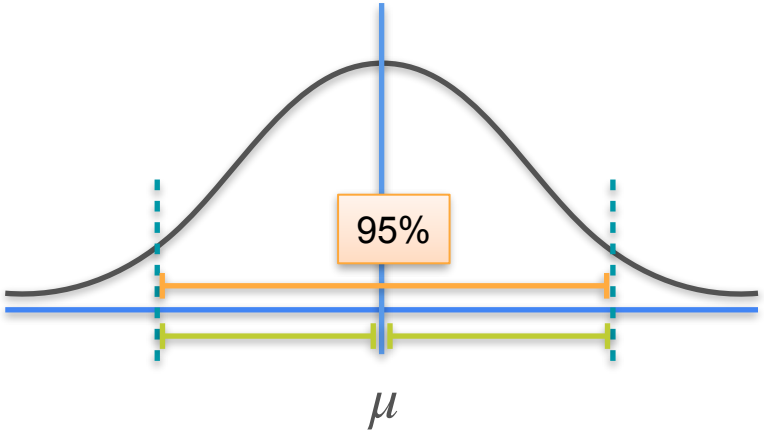


Effect of the Confidence Level

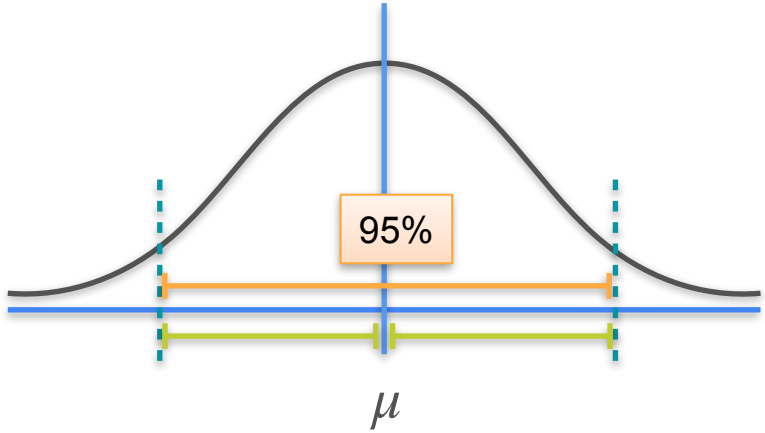
$n = 1$

$\mathcal{N}(\mu, \sigma^2)$

95%



70%

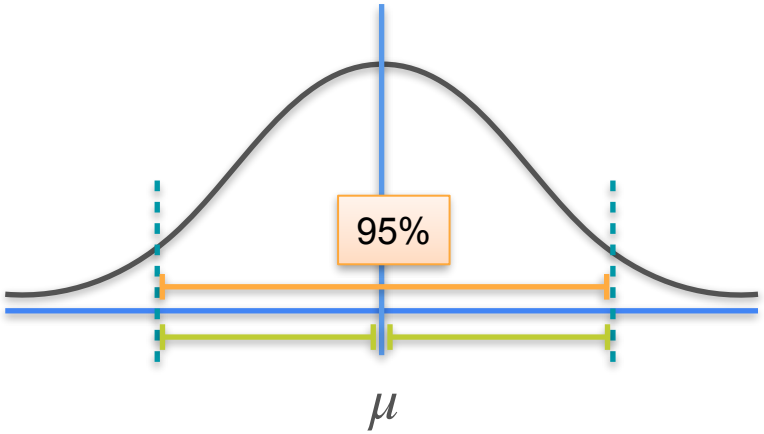


Effect of the Confidence Level

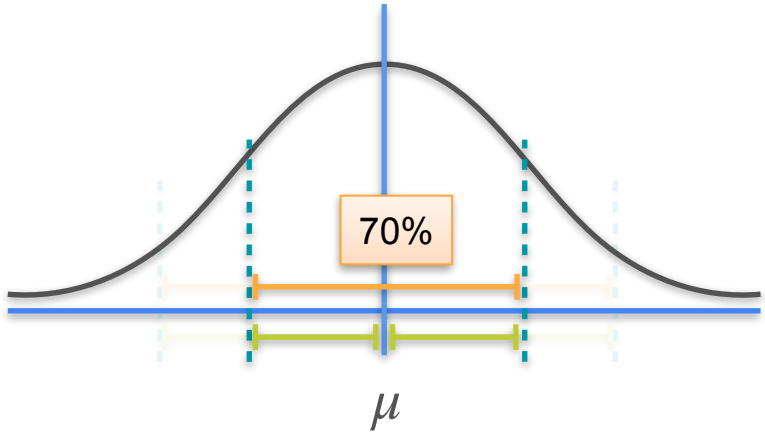
$n = 1$

$\mathcal{N}(\mu, \sigma^2)$

95%



70%

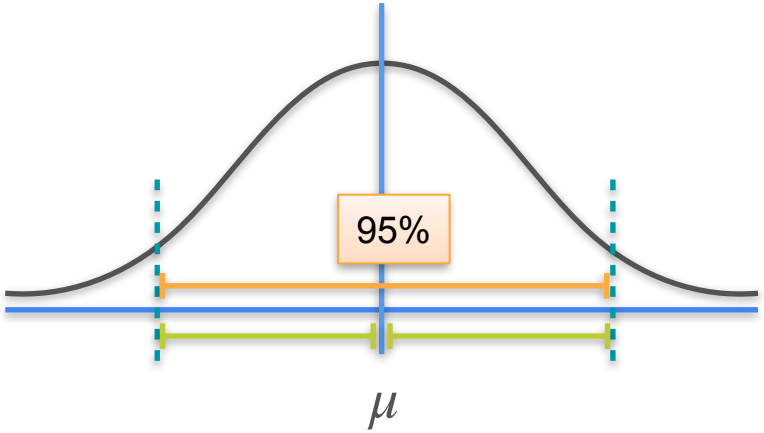


Effect of the Confidence Level

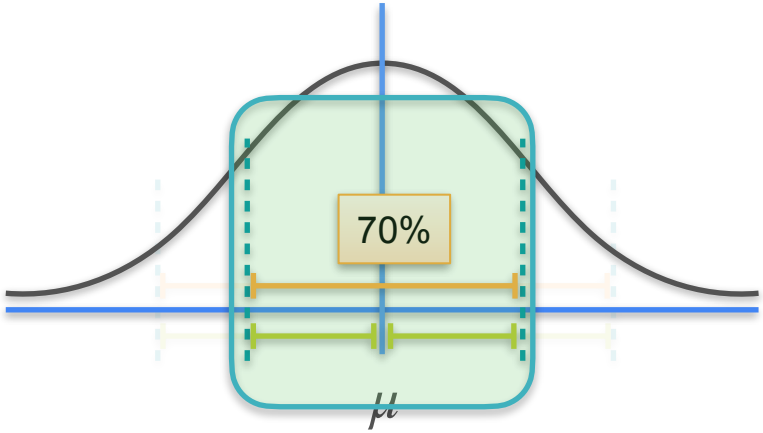
$n = 1$

$\mathcal{N}(\mu, \sigma^2)$

95%

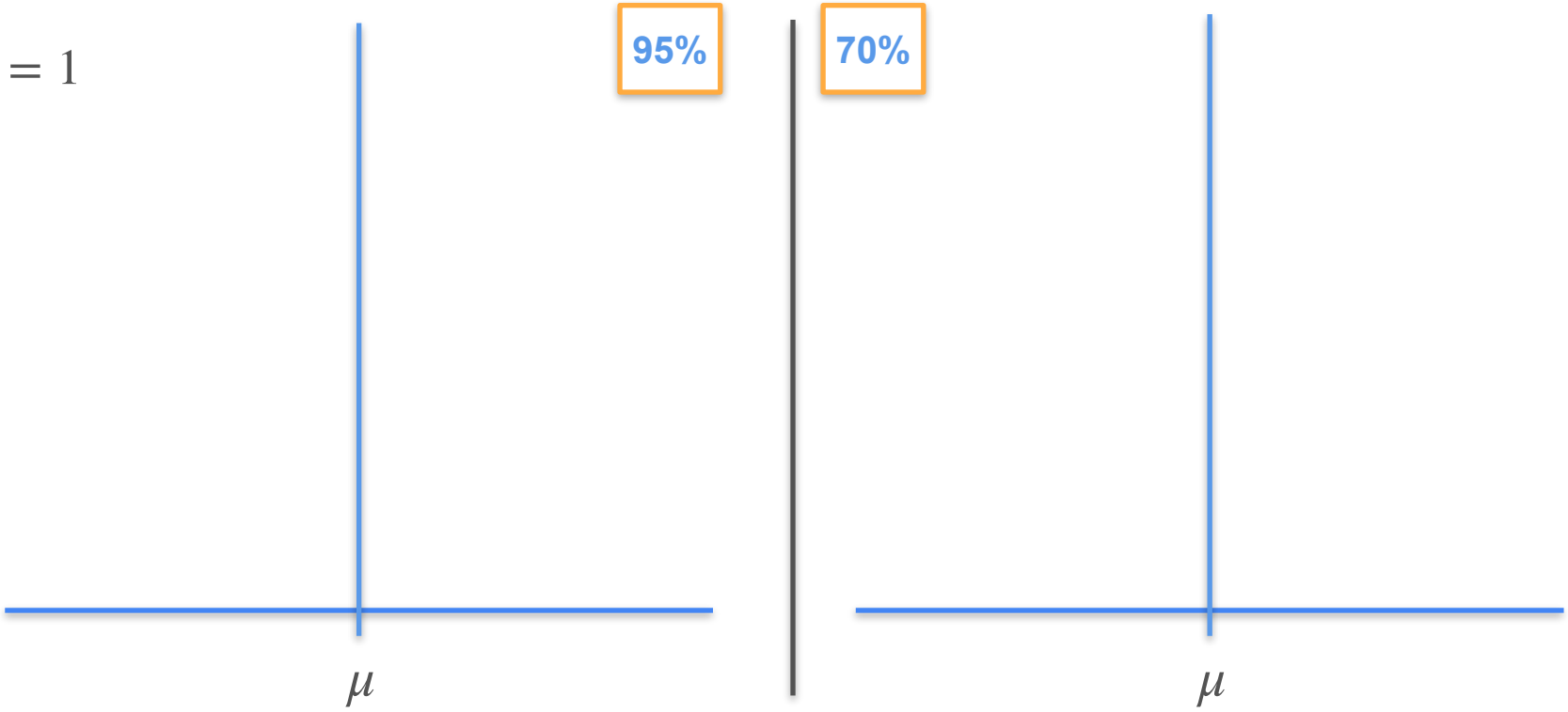


70%

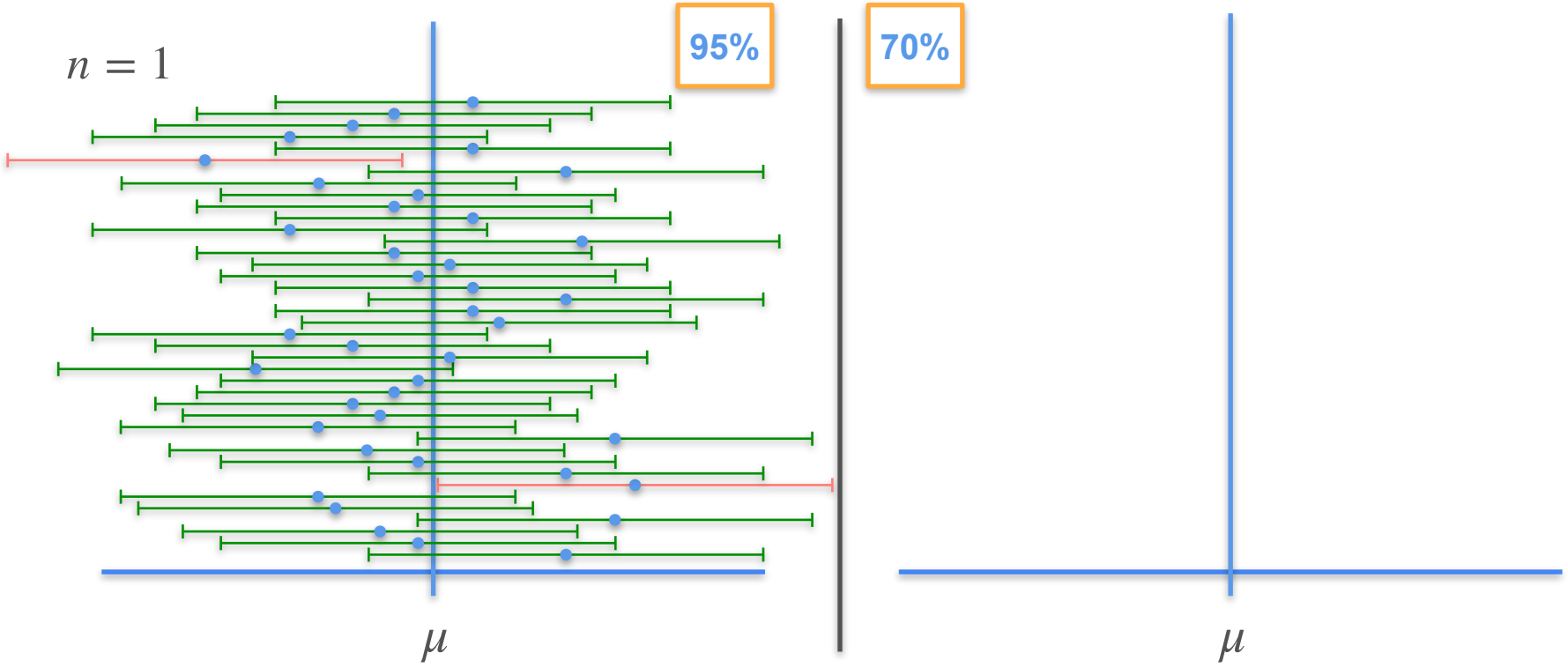


Effect of the Confidence Level

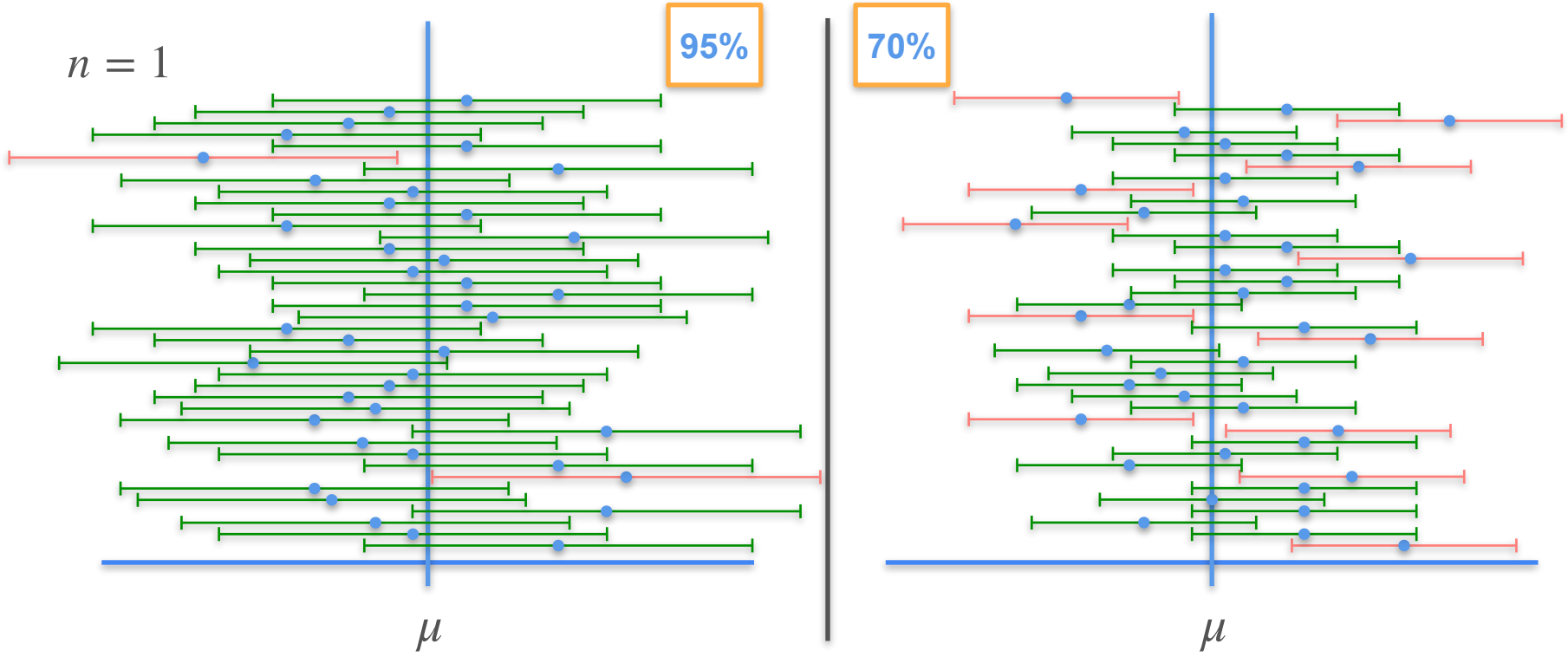
$n = 1$



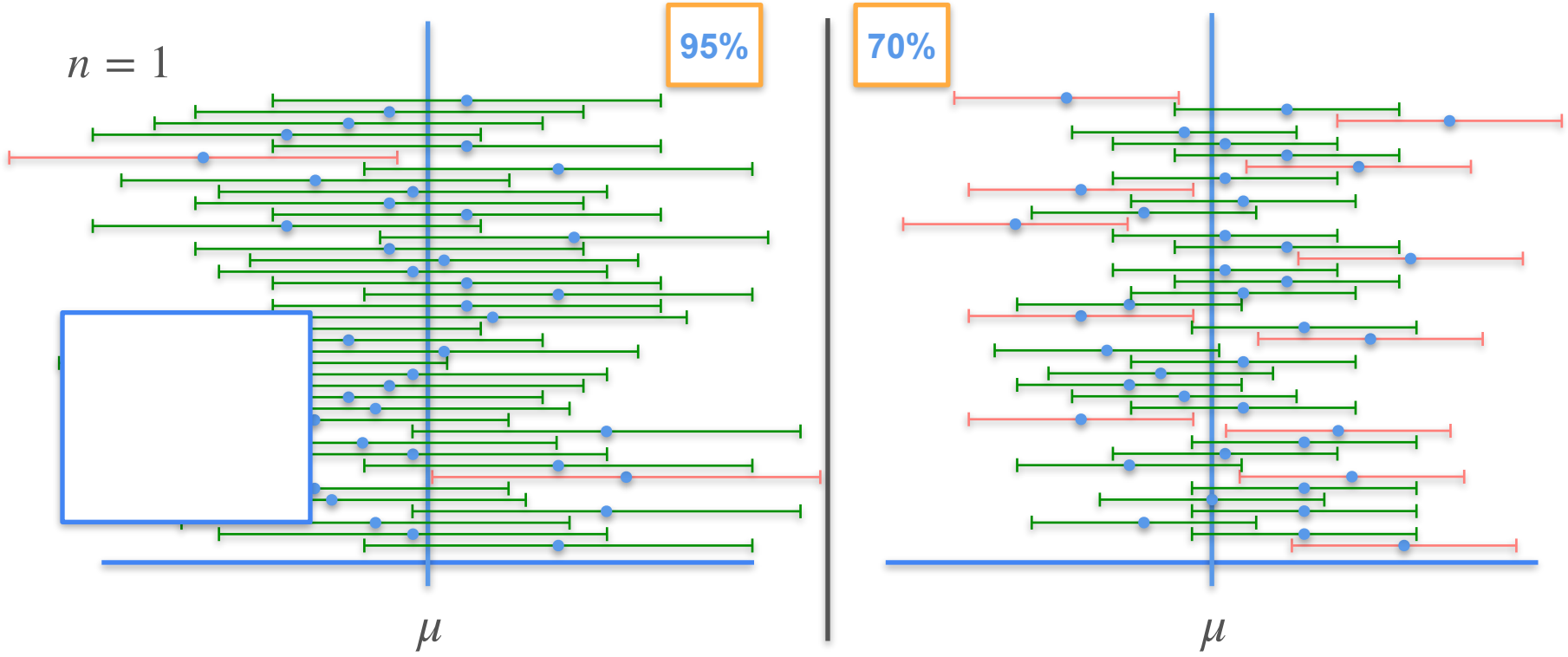
Effect of the Confidence Level



Effect of the Confidence Level



Effect of the Confidence Level



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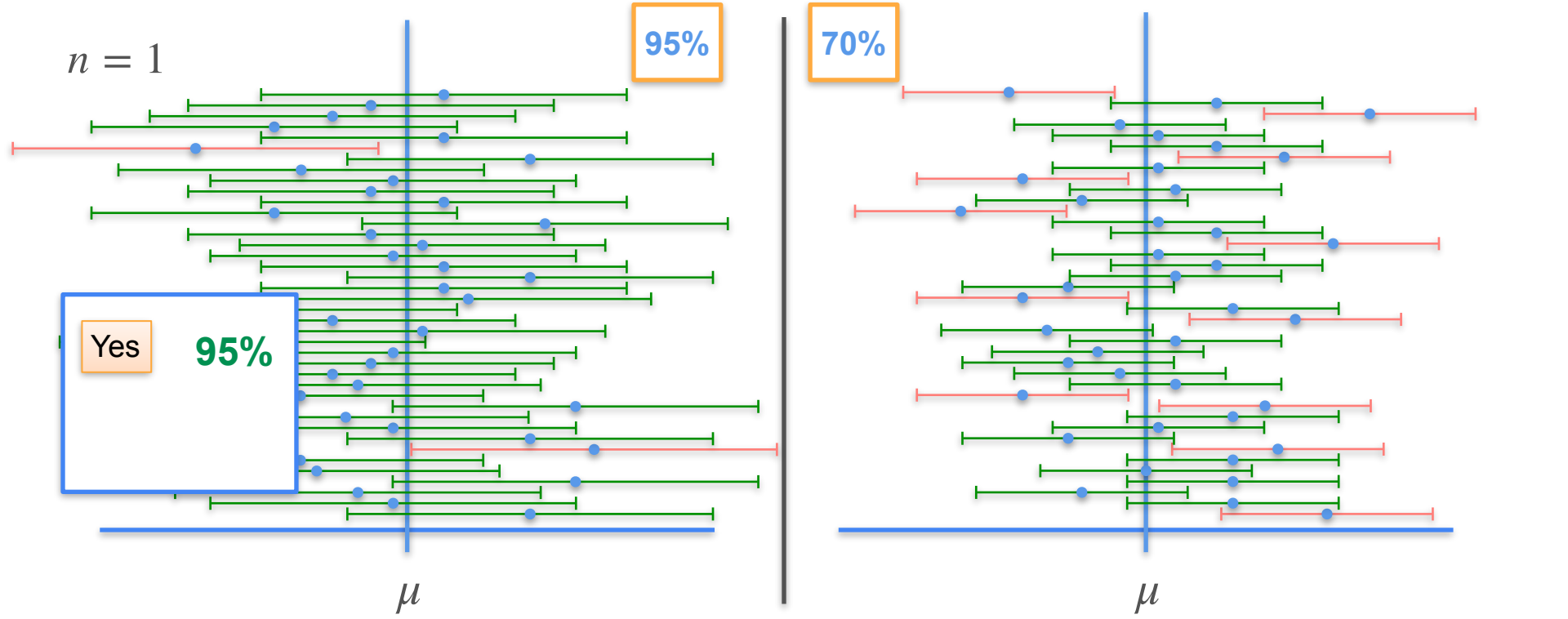
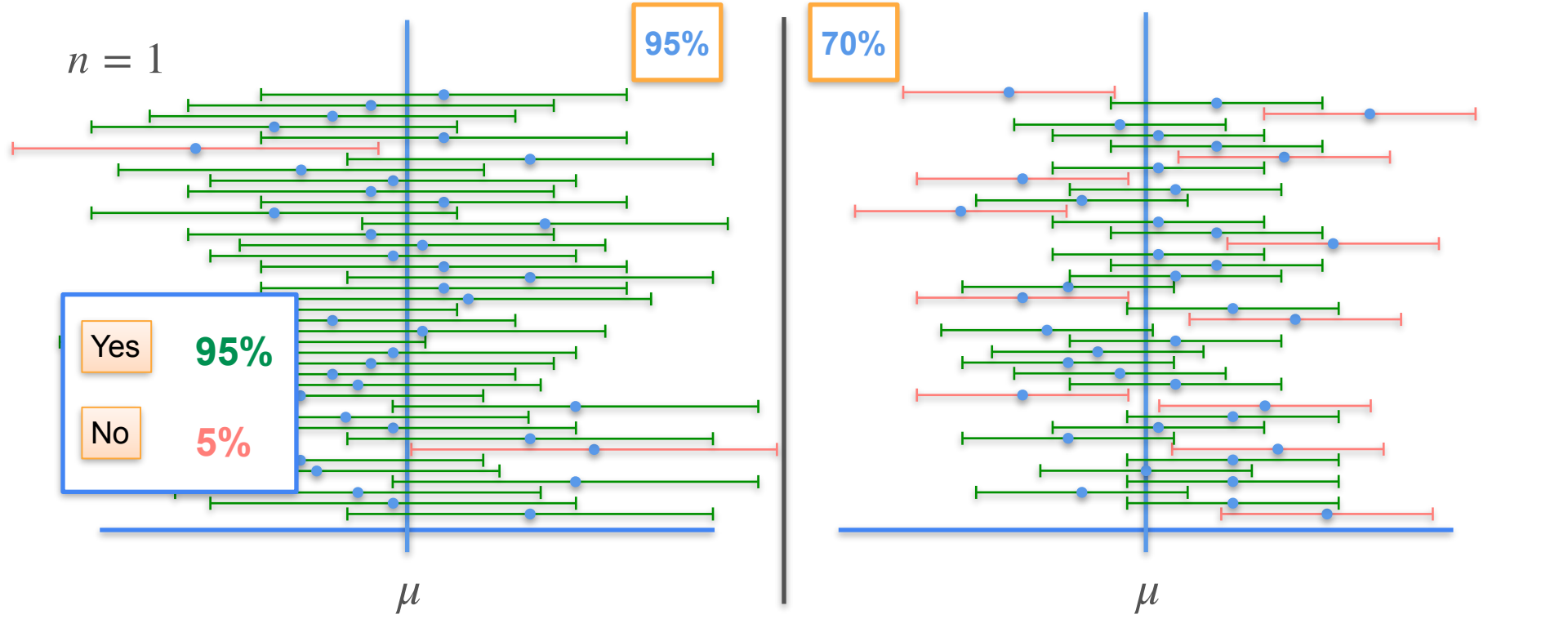


Effect of the Confidence Level



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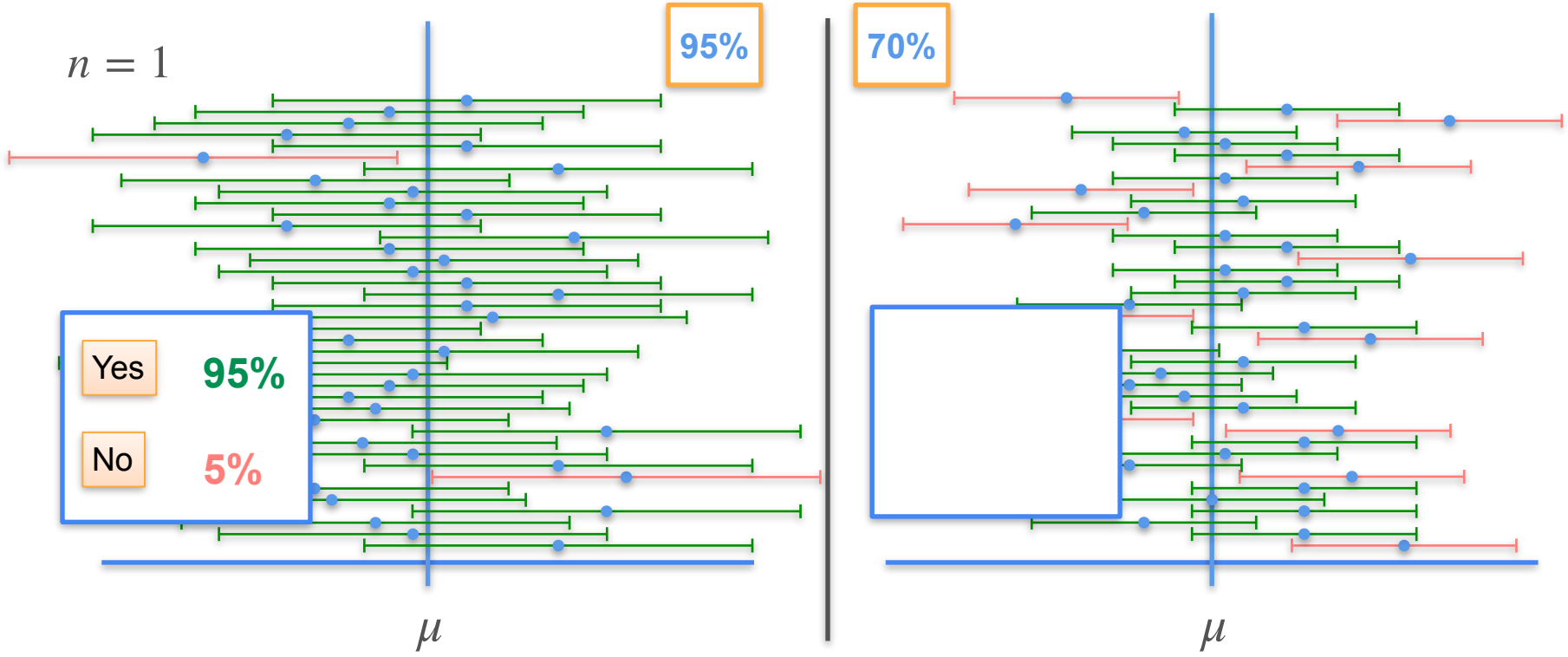

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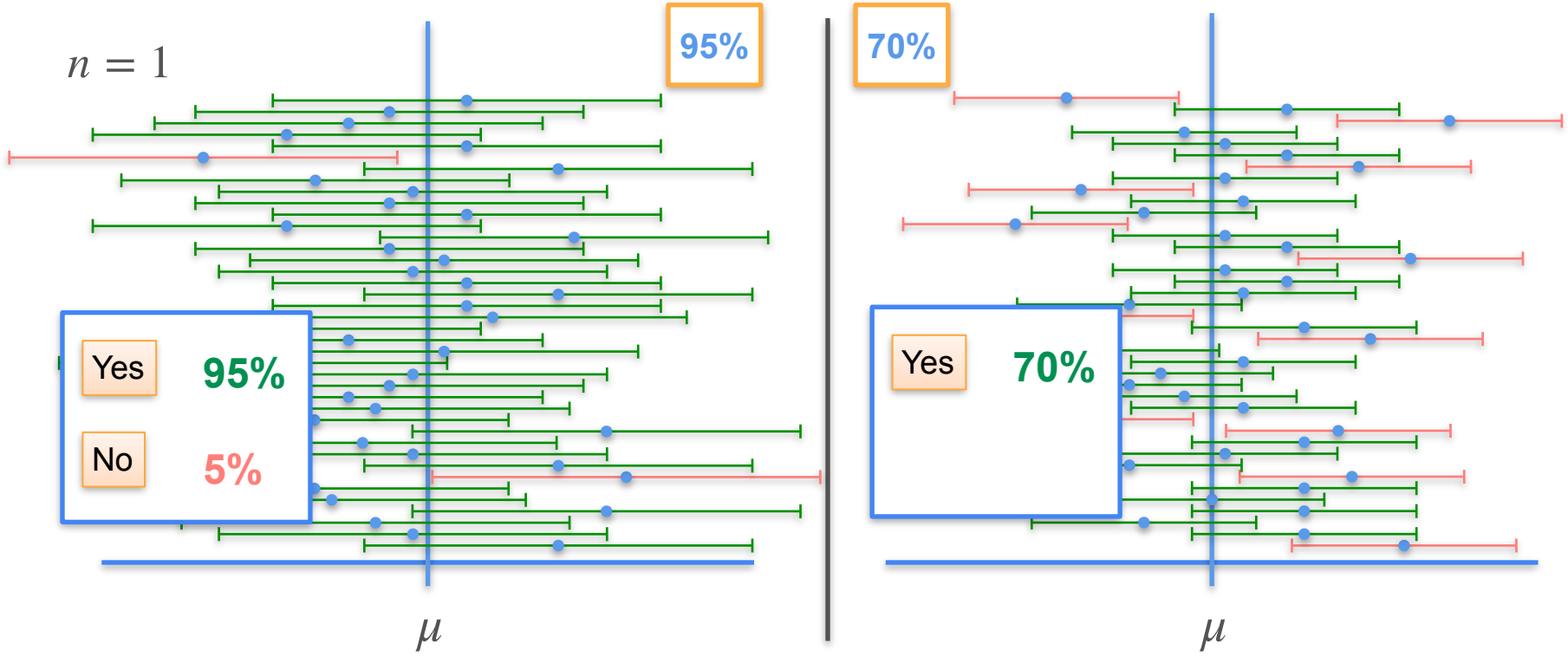

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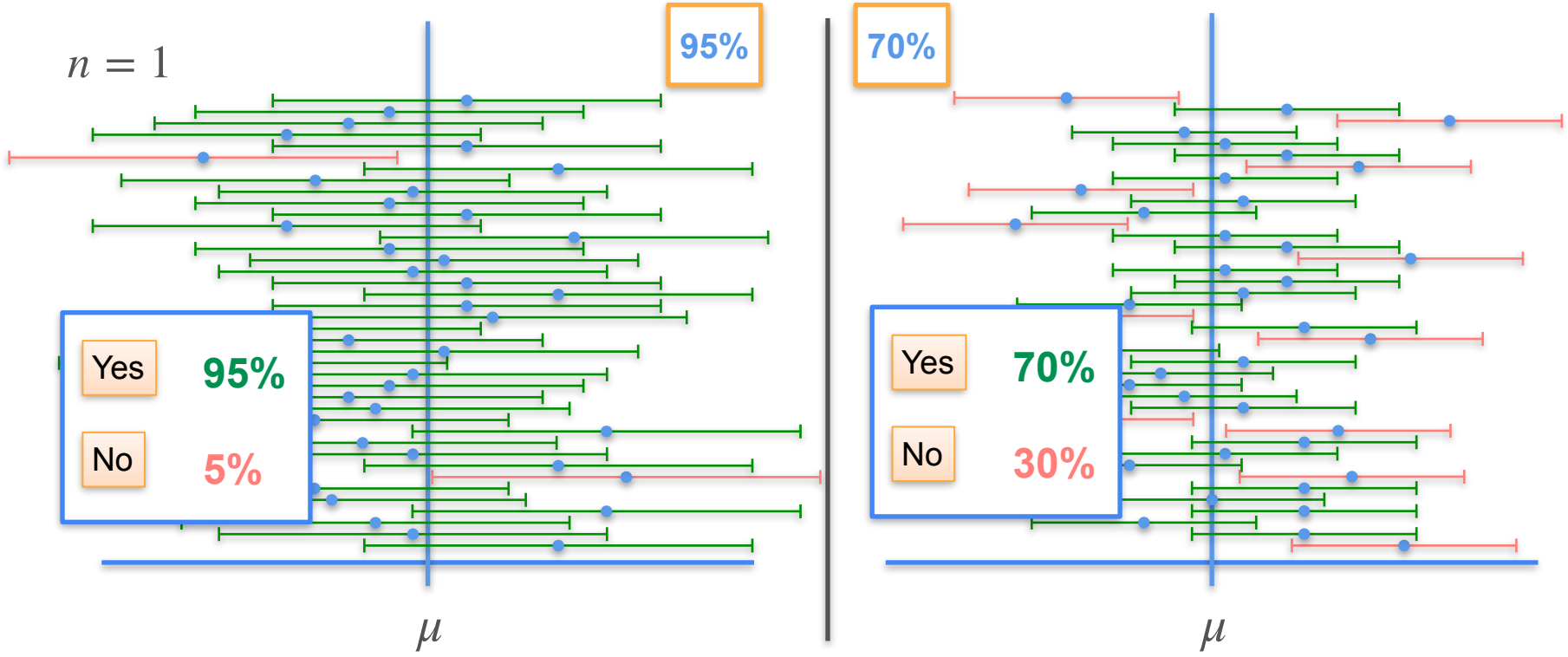
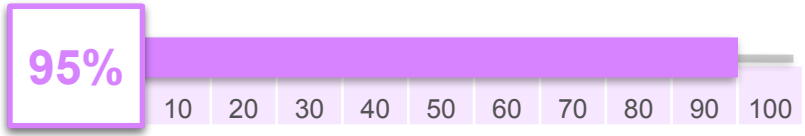
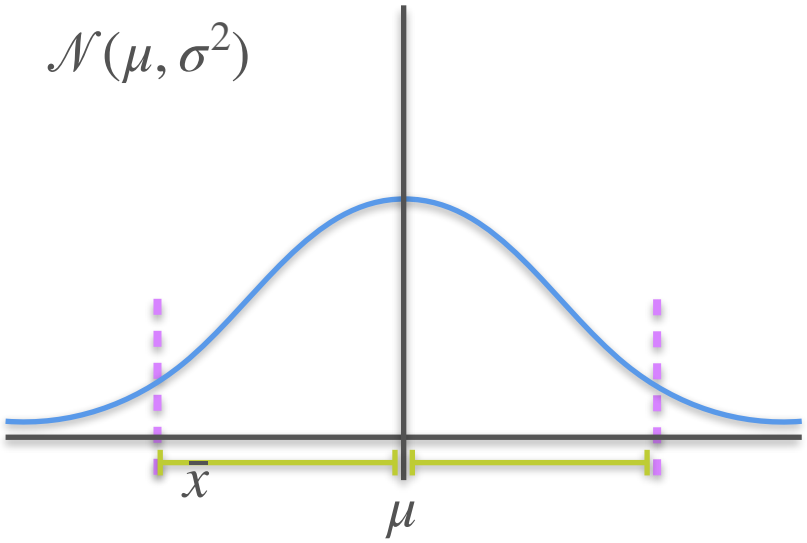


Effect of the Confidence Level

sample size

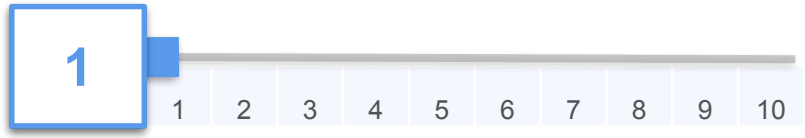
Confidence level



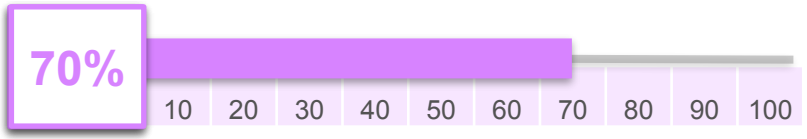


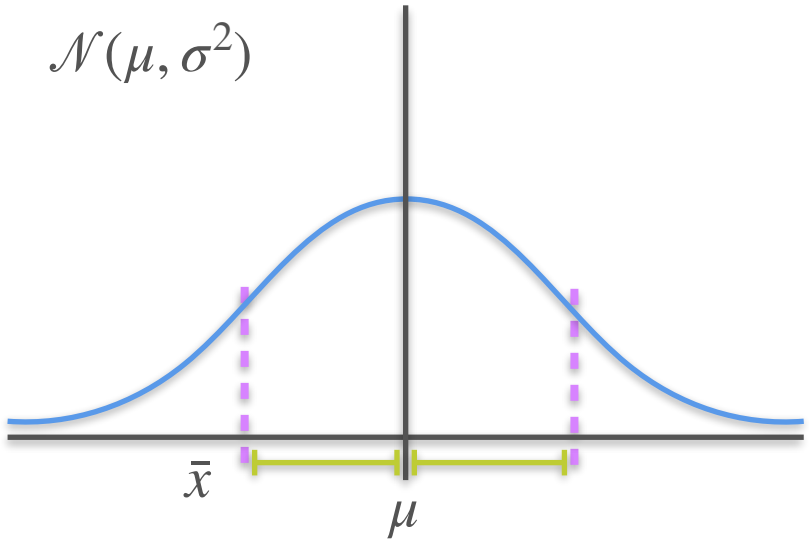
Effect of the Confidence Level

sample size



Confidence level

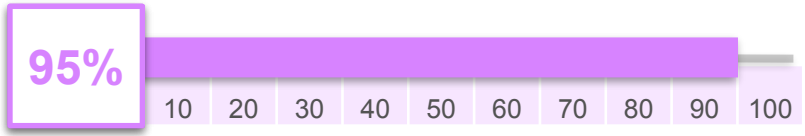


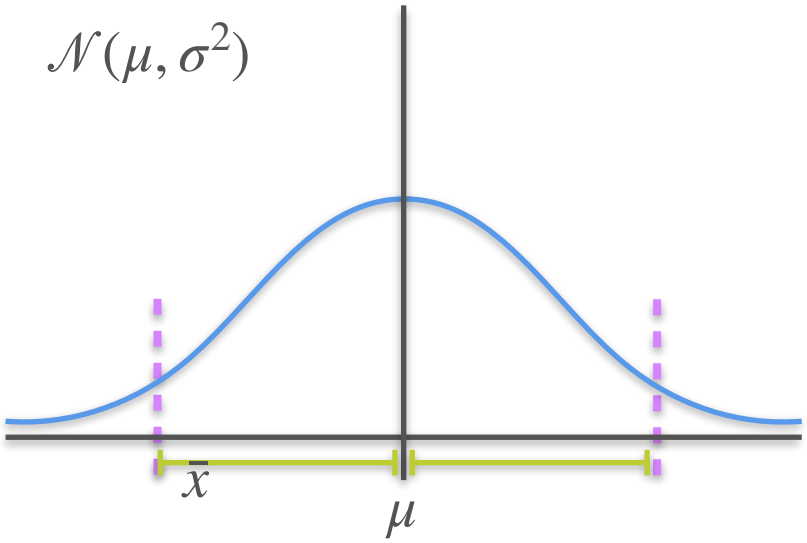


Effect of the Confidence Level

sample size

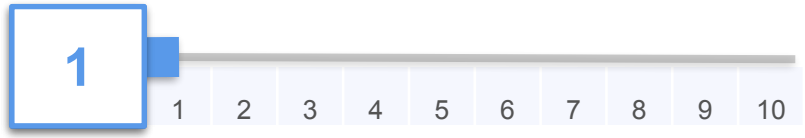
Confidence level



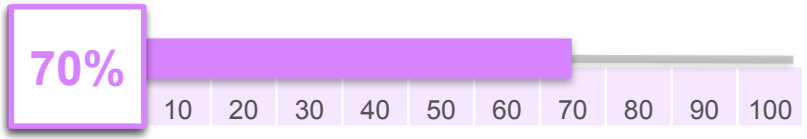


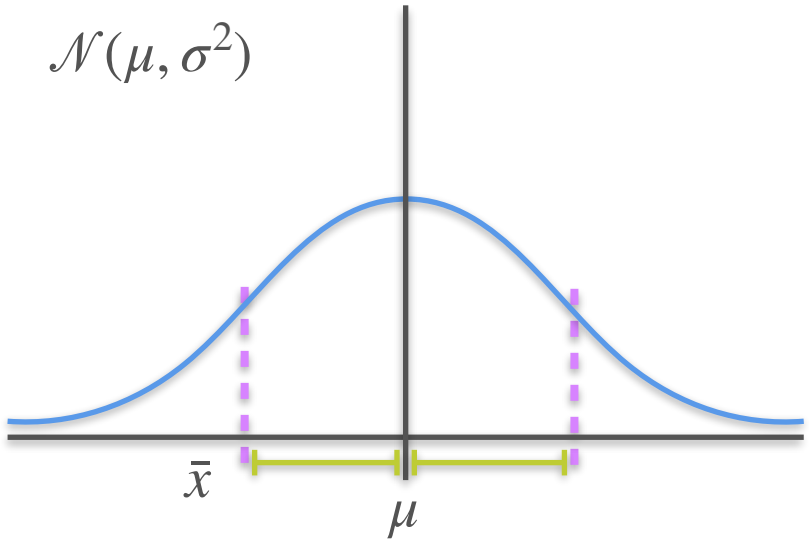
Effect of the Confidence Level

sample size



Confidence level



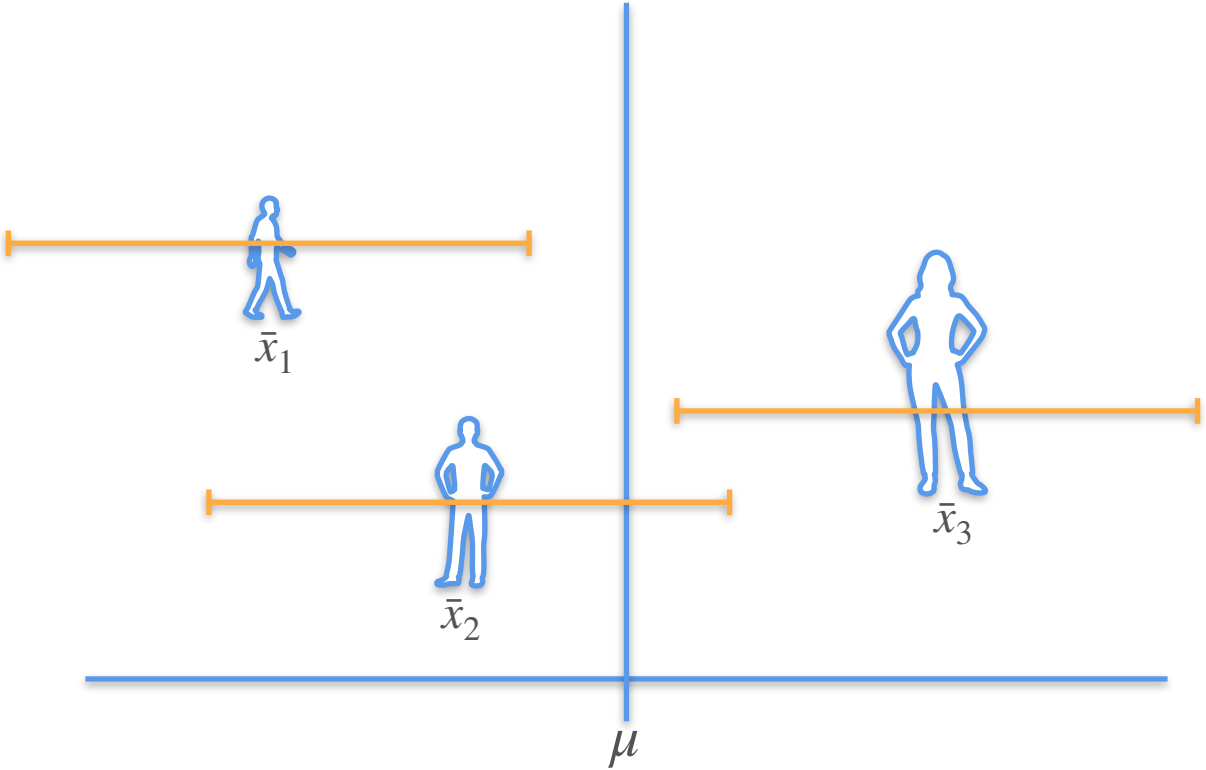


DeepLearning.AI

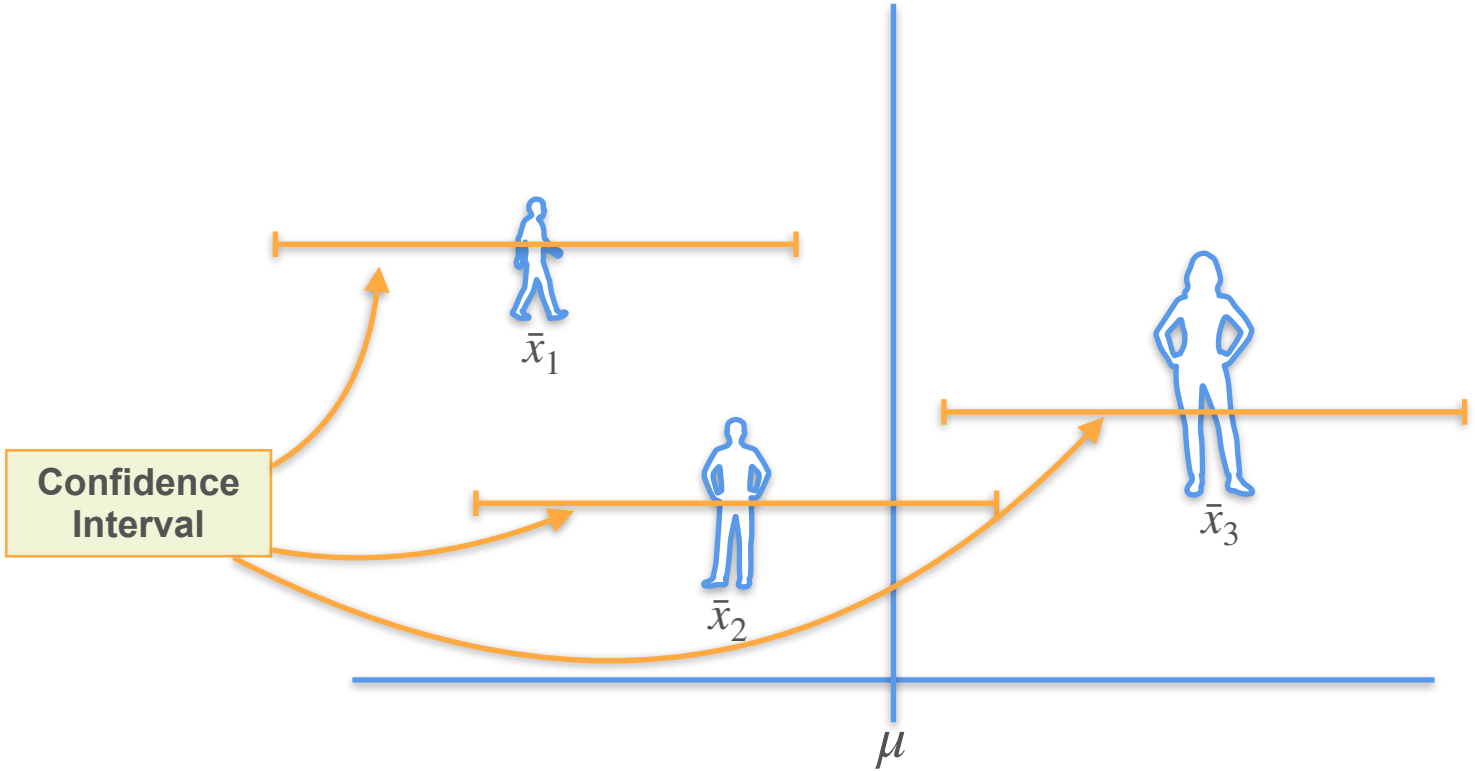
Confidence Interval

Margin of Error

Margin of Error - Introduction



Margin of Error - Introduction



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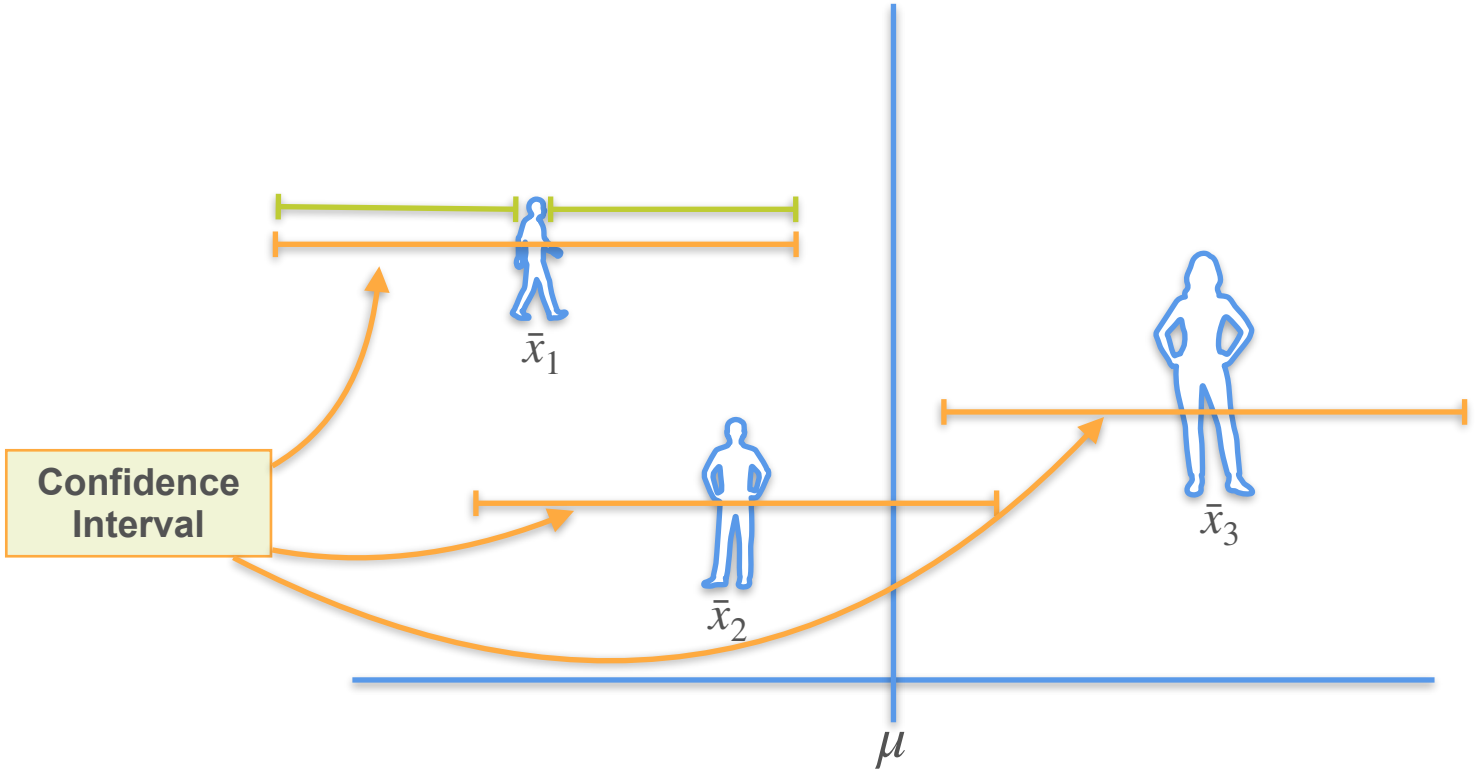

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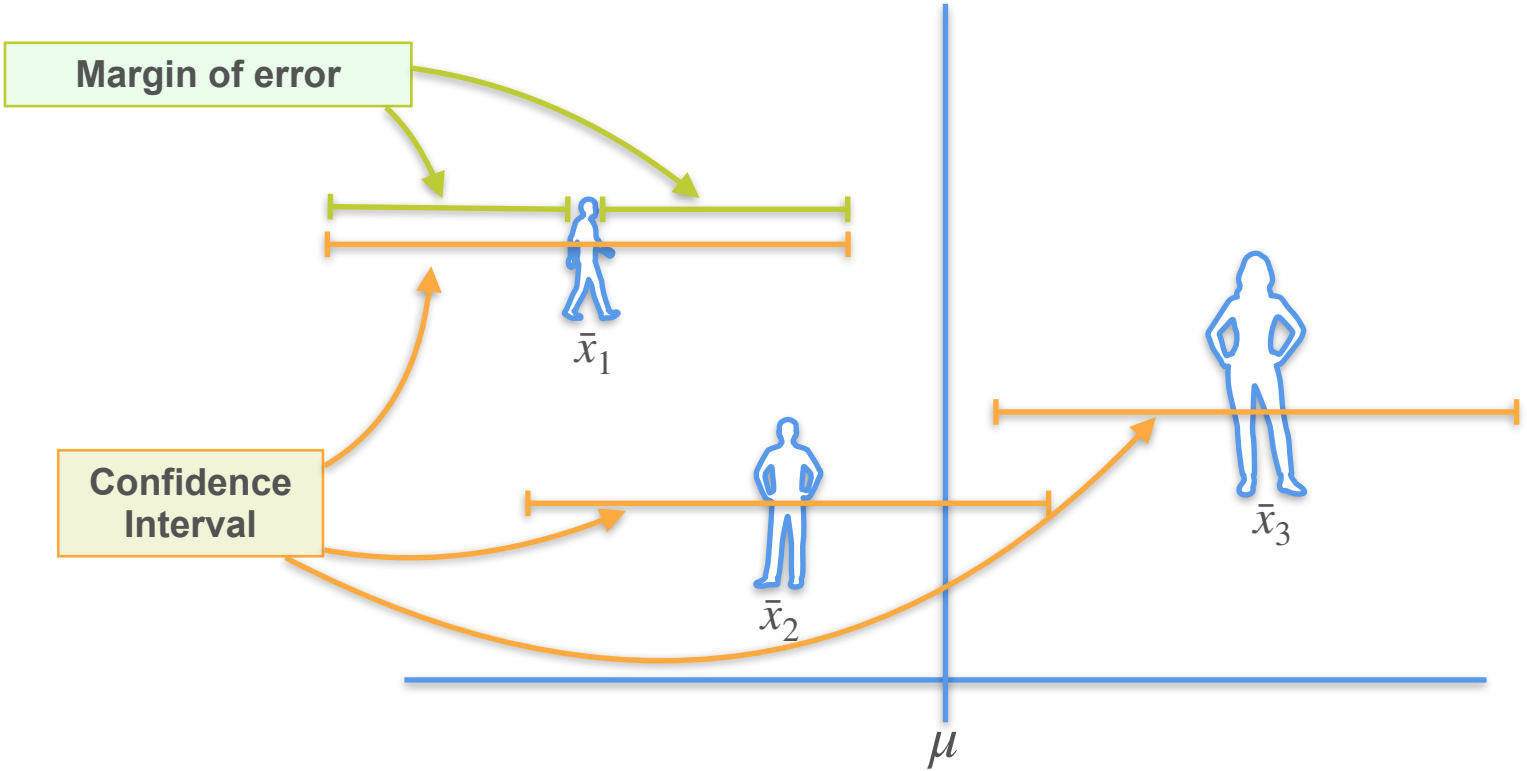

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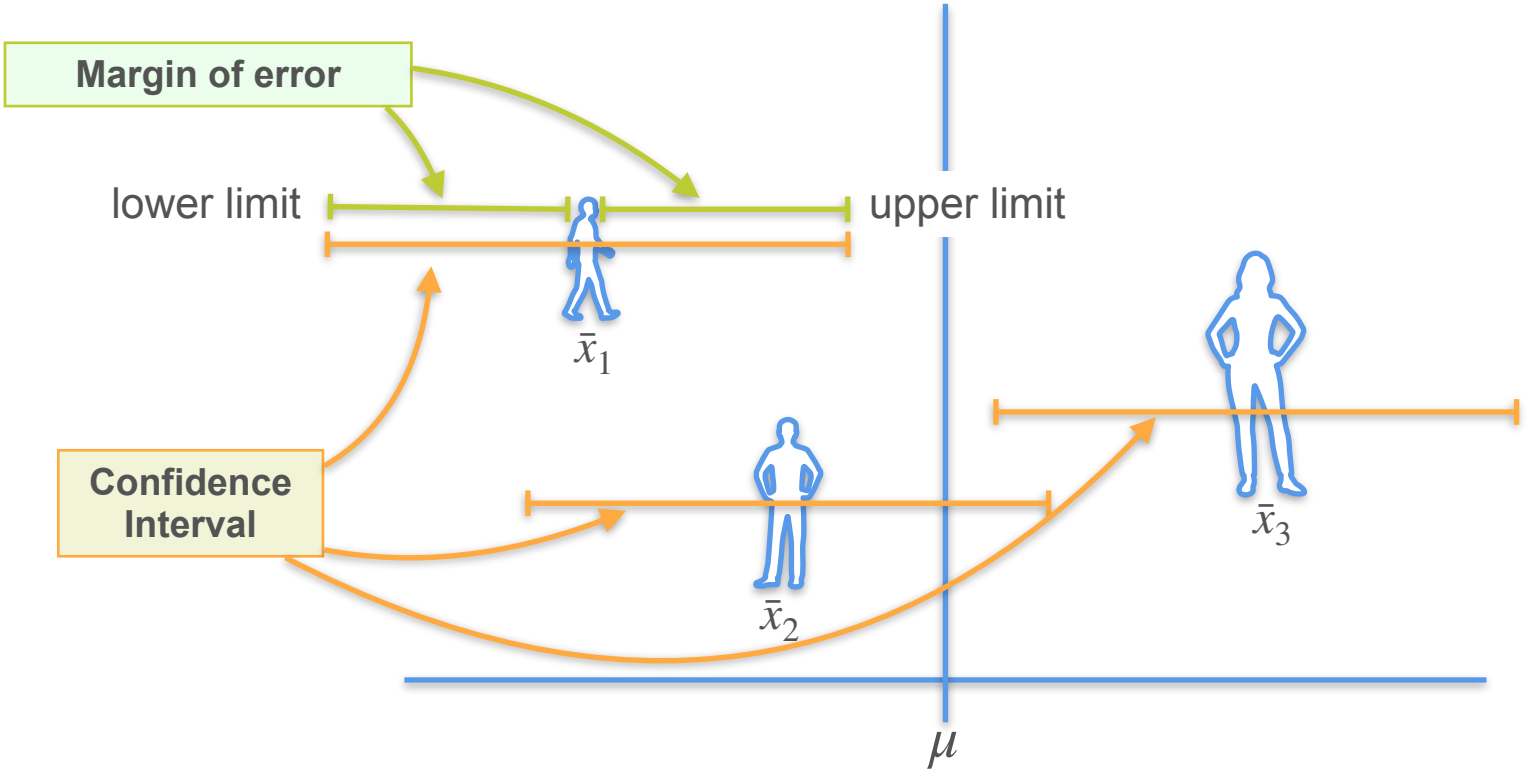

Margin of Error

Margin of Error

Taking multiple samples of size n

sampling distribution of the sample means

$$\bar{X} \sim \mathcal{N}\left(\mu_{\bar{x}}, \frac{\sigma^2}{n}\right)$$

Margin of Error

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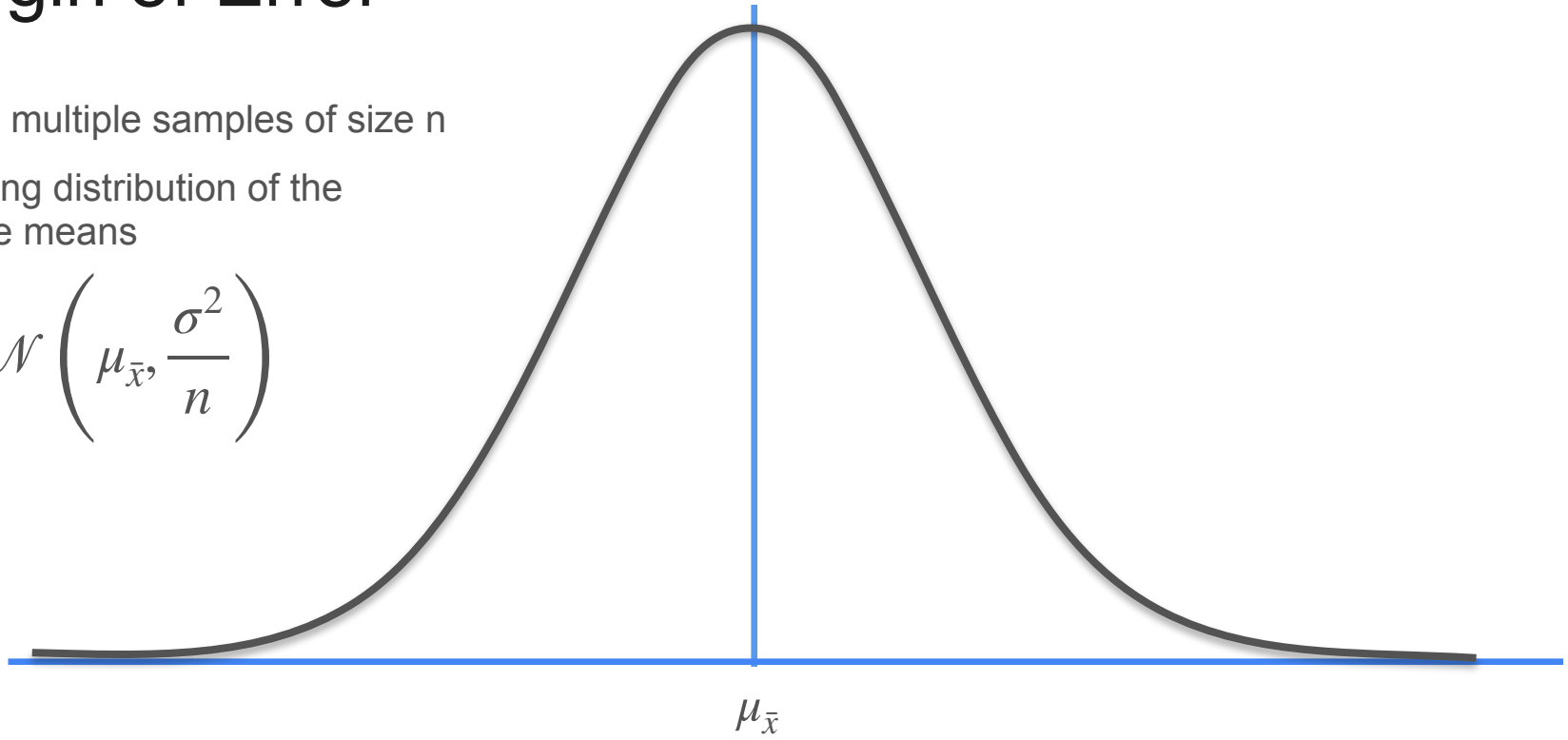

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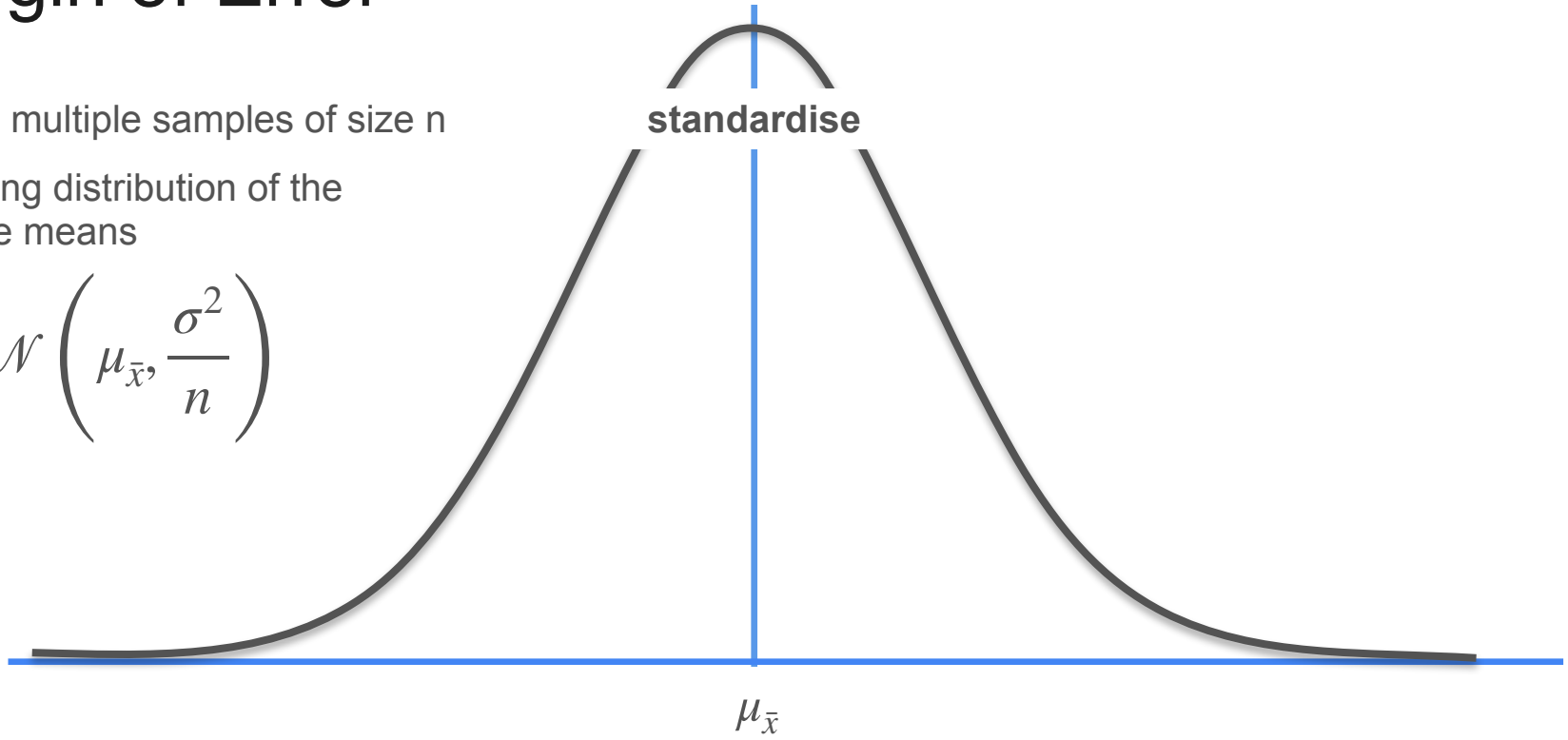
$$\bar{X} \sim \mathcal{N}\left(\mu_{\bar{x}}, \frac{\sigma^2}{n}\right)$$



Margin of Error

Taking multiple samples of size n

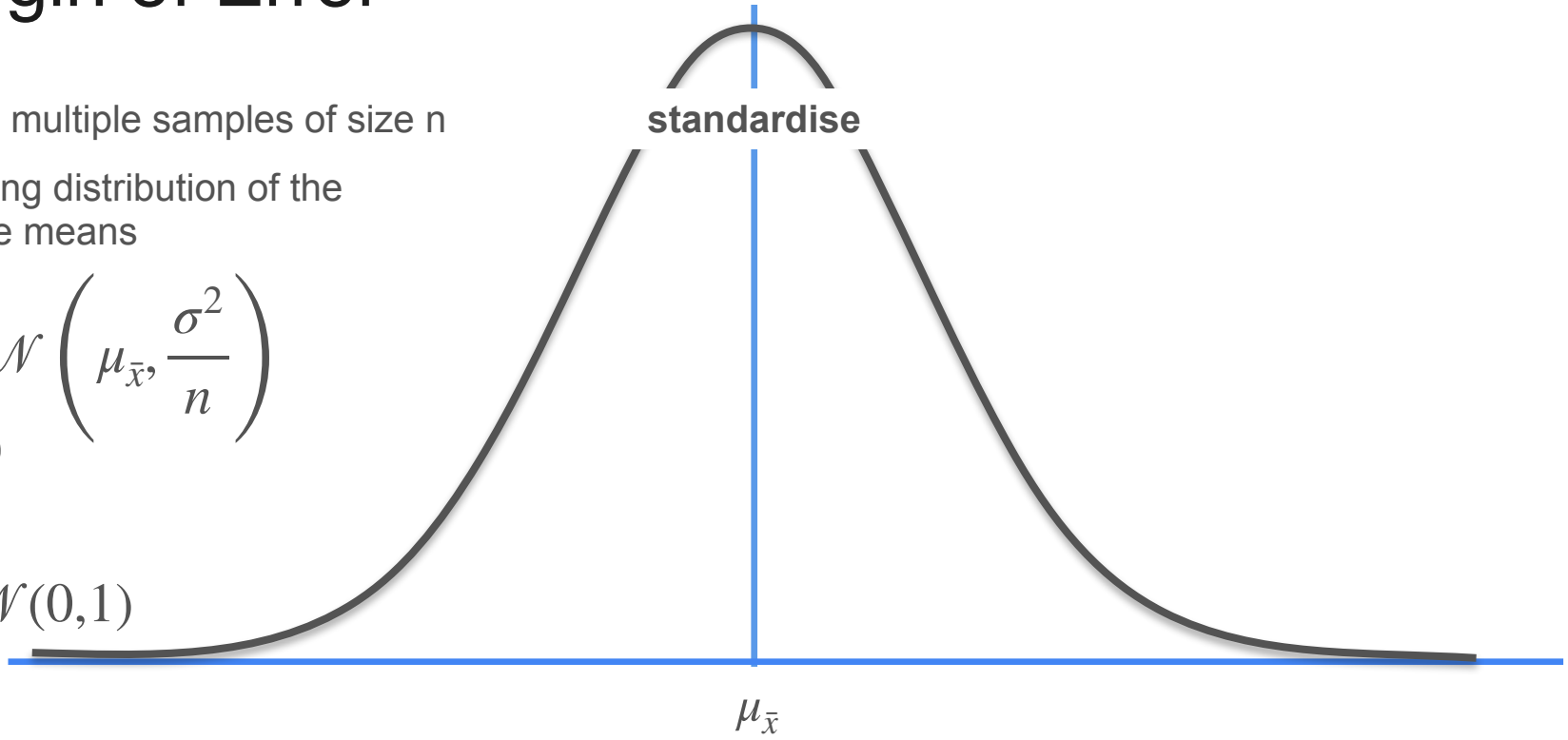
sampling distribution of the sample means

$$\bar{X} \sim \mathcal{N}\left(\mu_{\bar{x}}, \frac{\sigma^2}{n}\right)$$

$$\mu = 0$$

$$\sigma = 1$$

$$\bar{X} \sim \mathcal{N}(0,1)$$



Margin of Error

Taking multiple samples of size n

sampling distribution of the sample means

$$\bar{X} \sim \mathcal{N}\left(\mu_{\bar{x}}, \frac{\sigma^2}{n}\right)$$

$$\mu = 0$$

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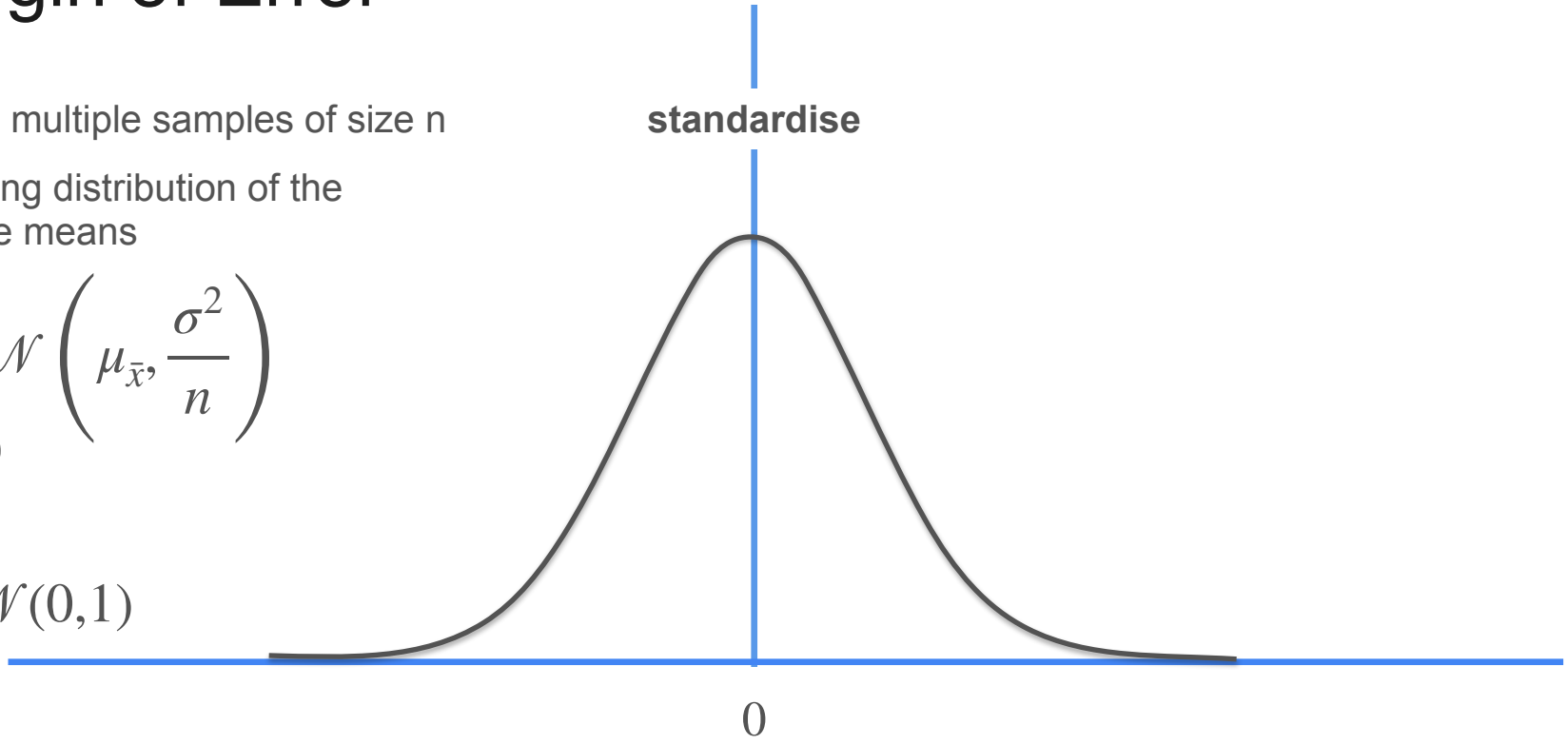


Margin of Error

Taking multiple samples of size n

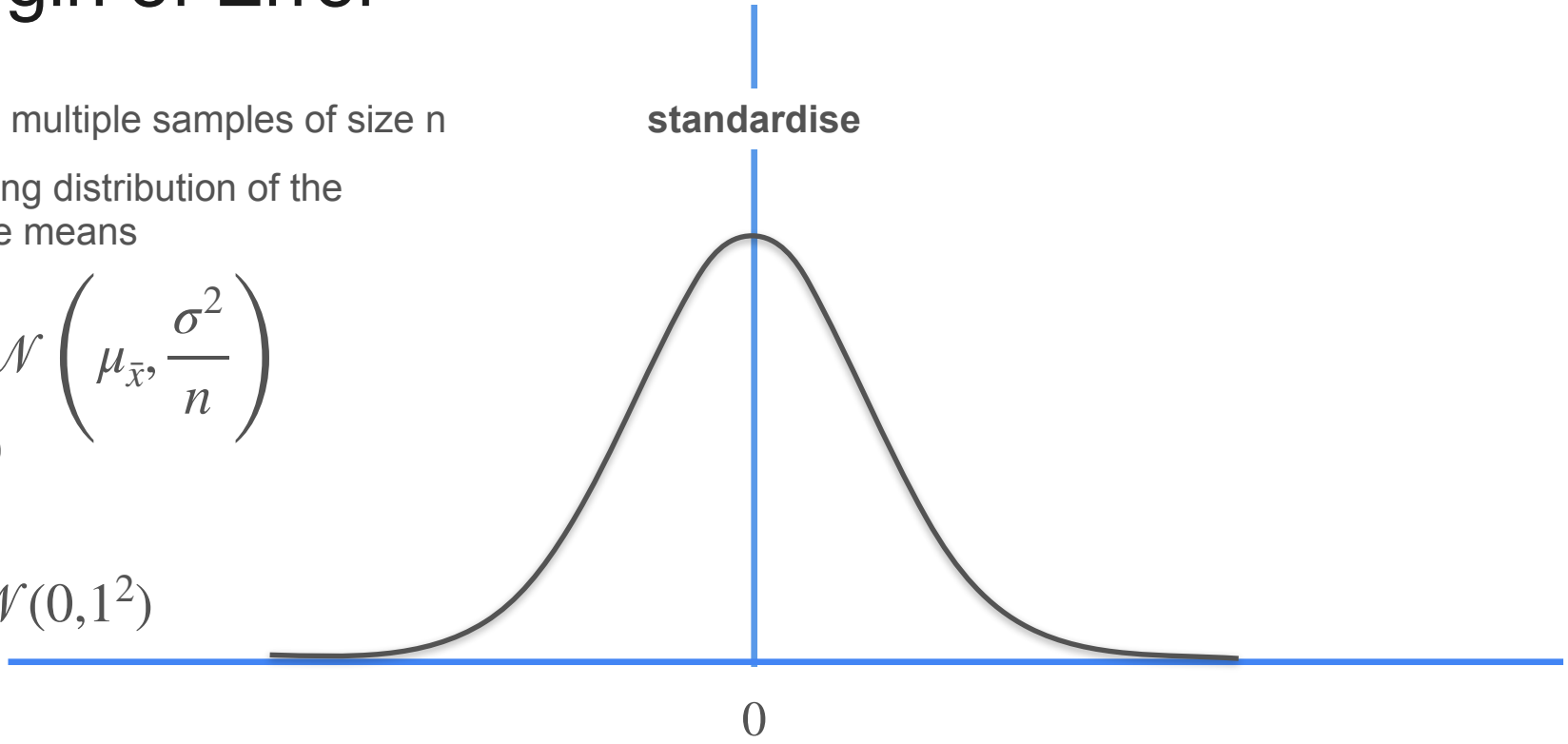
sampling distribution of the sample means

$$\bar{X} \sim \mathcal{N}\left(\mu_{\bar{x}}, \frac{\sigma^2}{n}\right)$$

$$\mu = 0$$

$$\sigma = 1$$

$$\bar{X} \sim \mathcal{N}(0, 1^2)$$

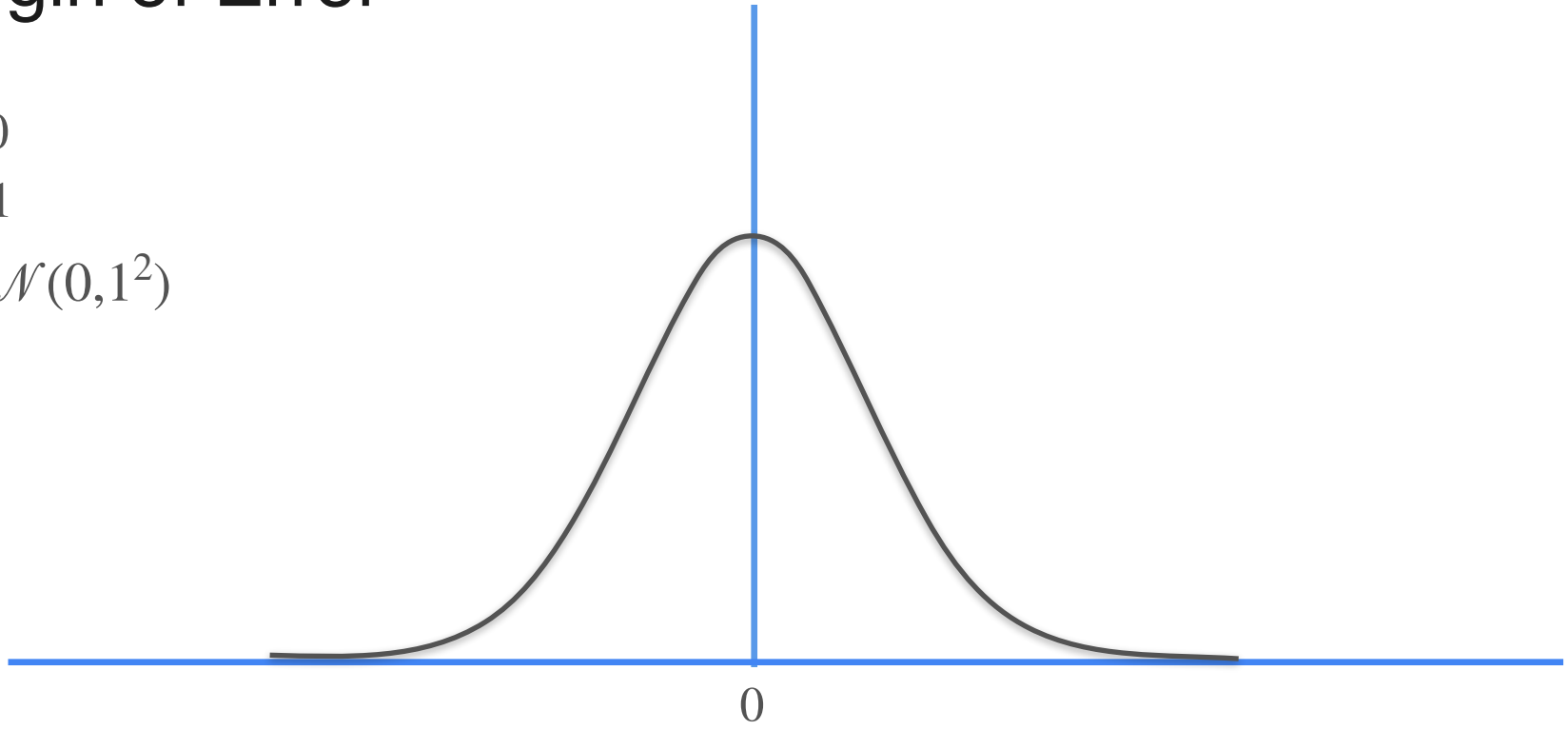


Margin of Error

$\mu = 0$

$\sigma = 1$

$\bar{X} \sim \mathcal{N}(0, 1^2)$



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$\mu = 0$

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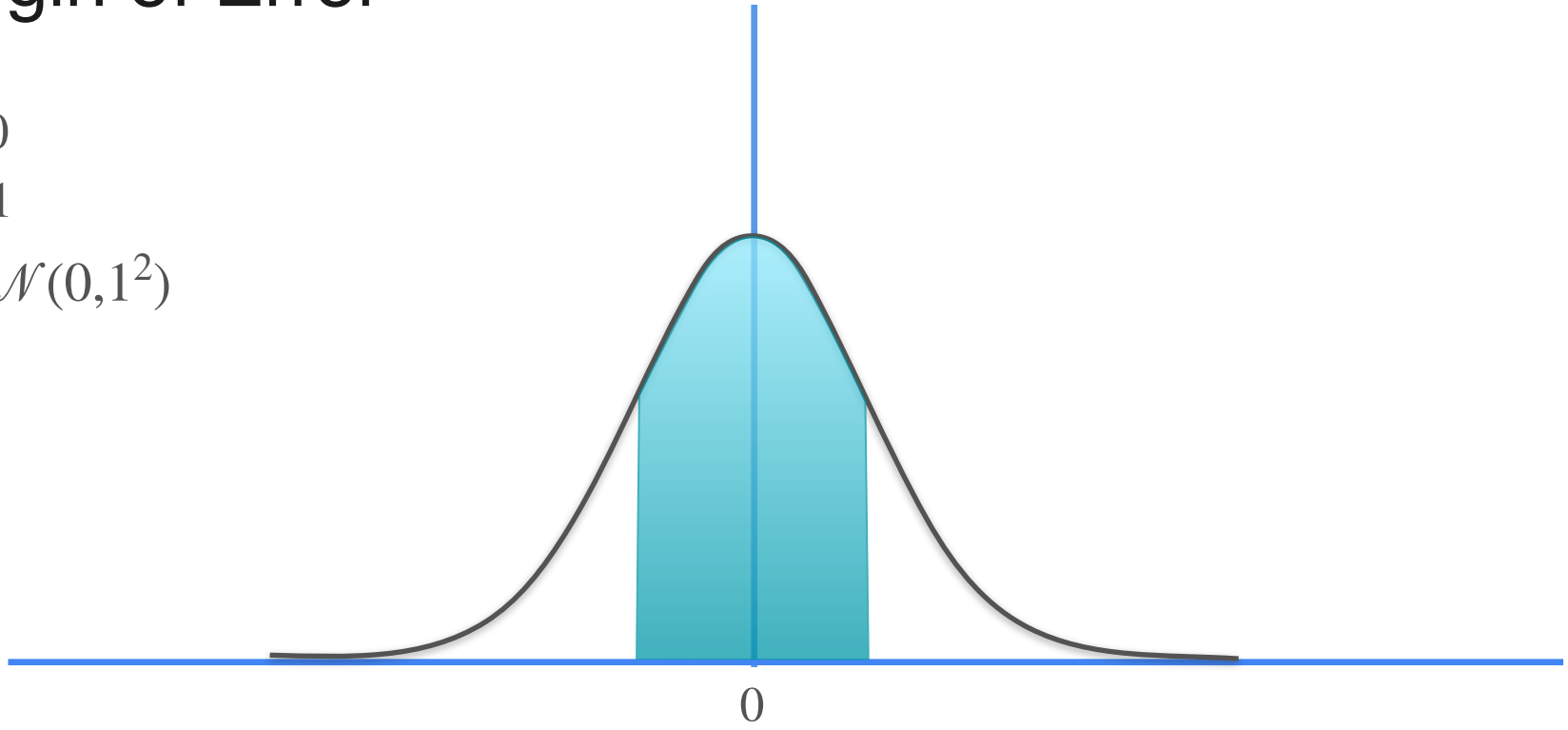

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$\mu = 0$

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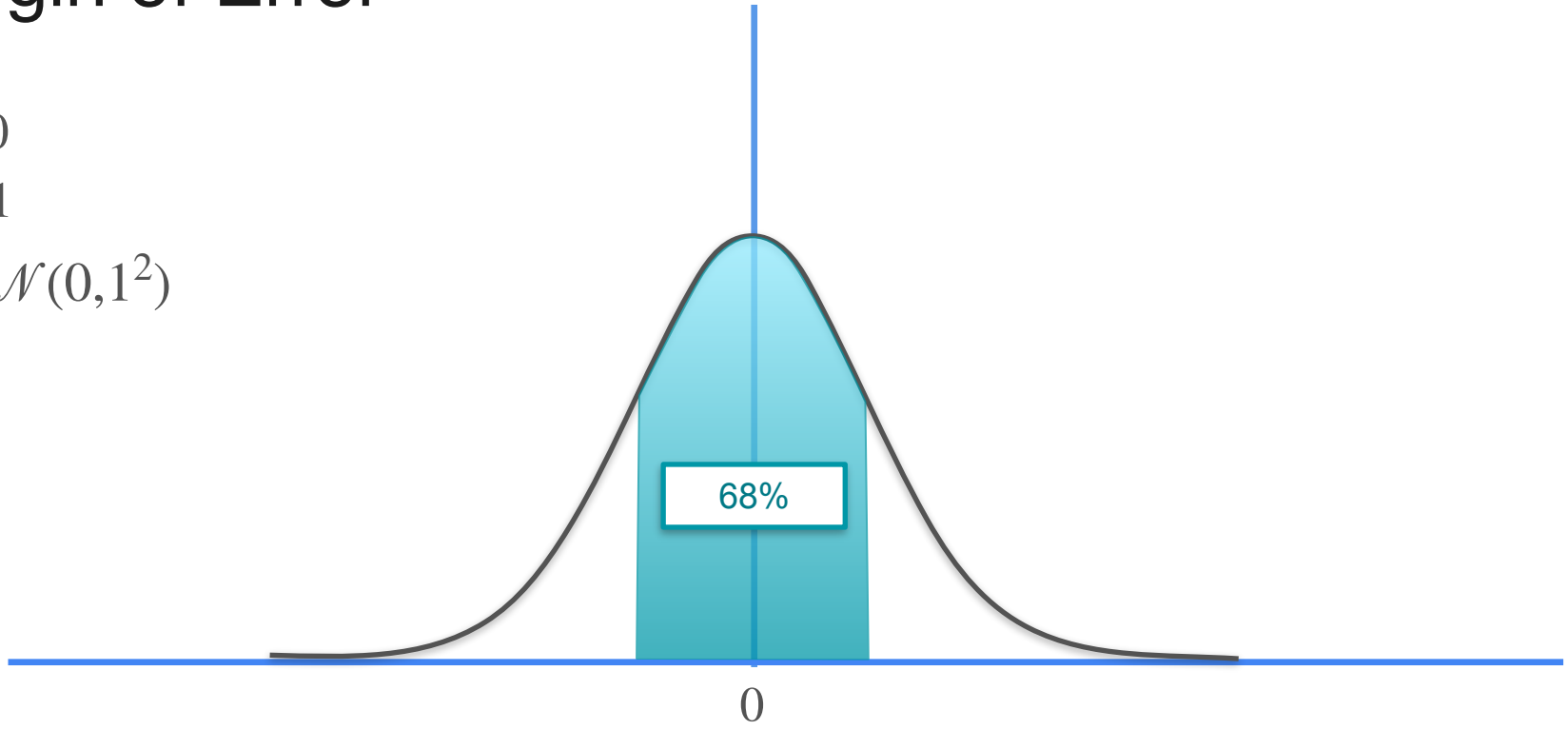

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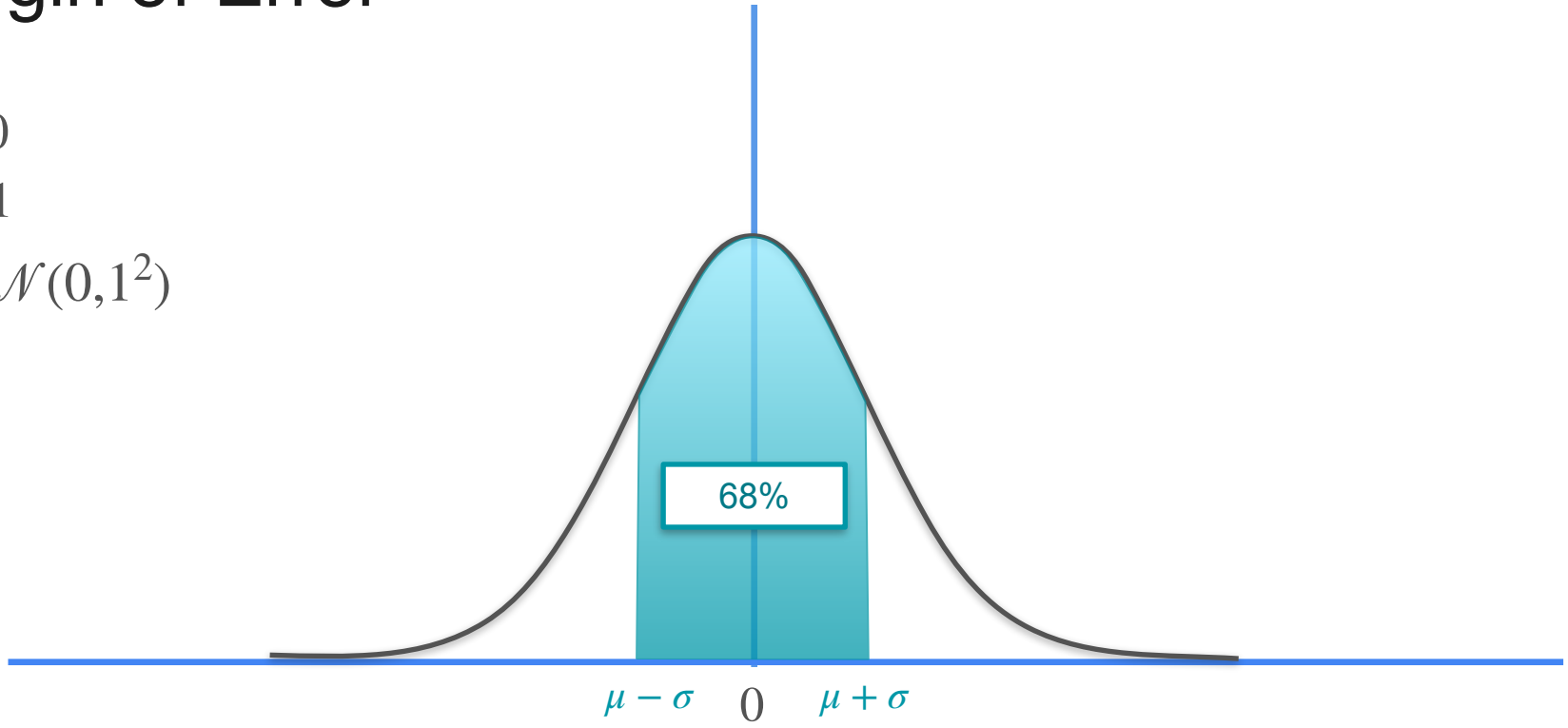
$$\sigma = 1$$
$$\bar{X} \sim \mathcal{N}(0, 1^2)$$

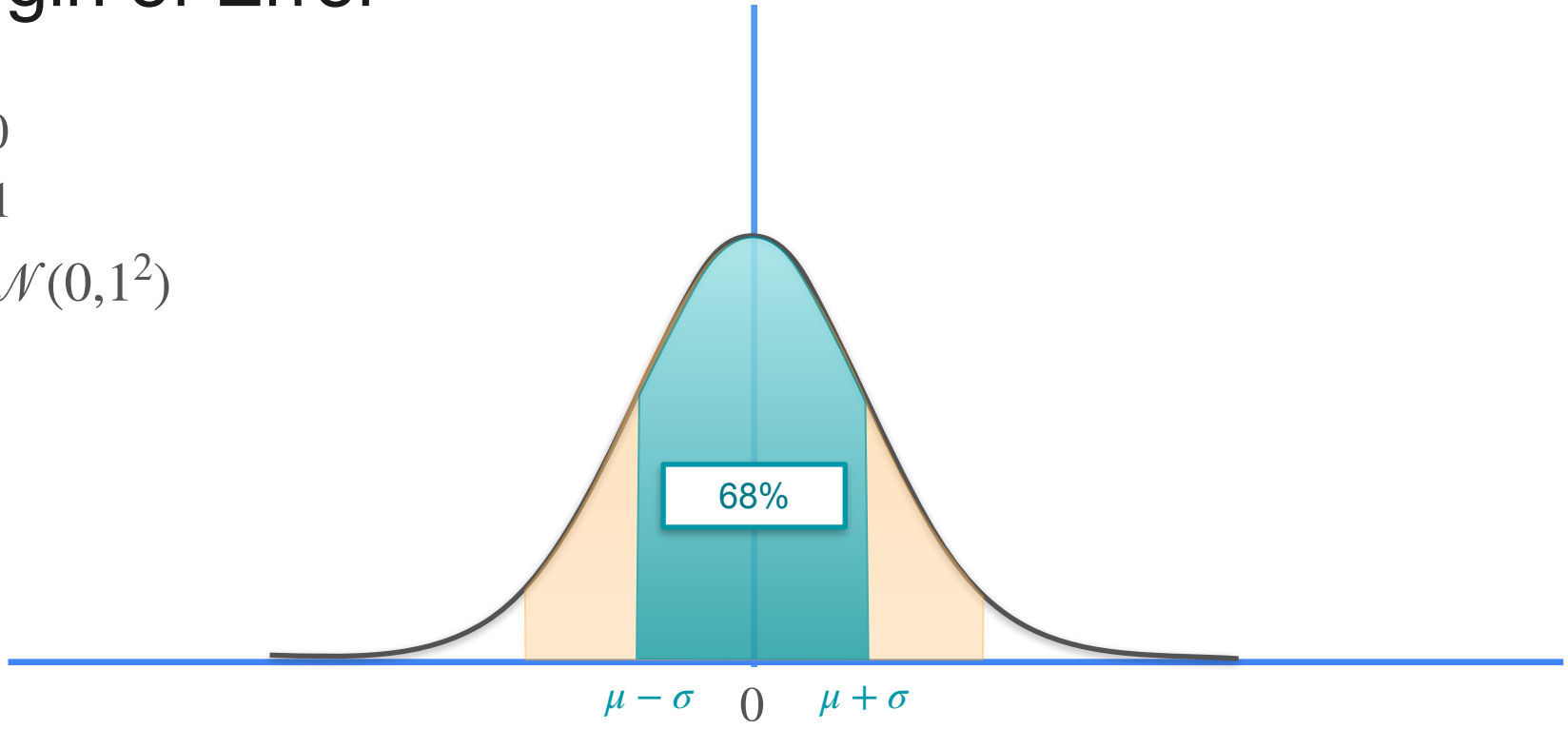


Margin of Error

$\mu = 0$

$\sigma = 1$

$\bar{X} \sim \mathcal{N}(0, 1^2)$



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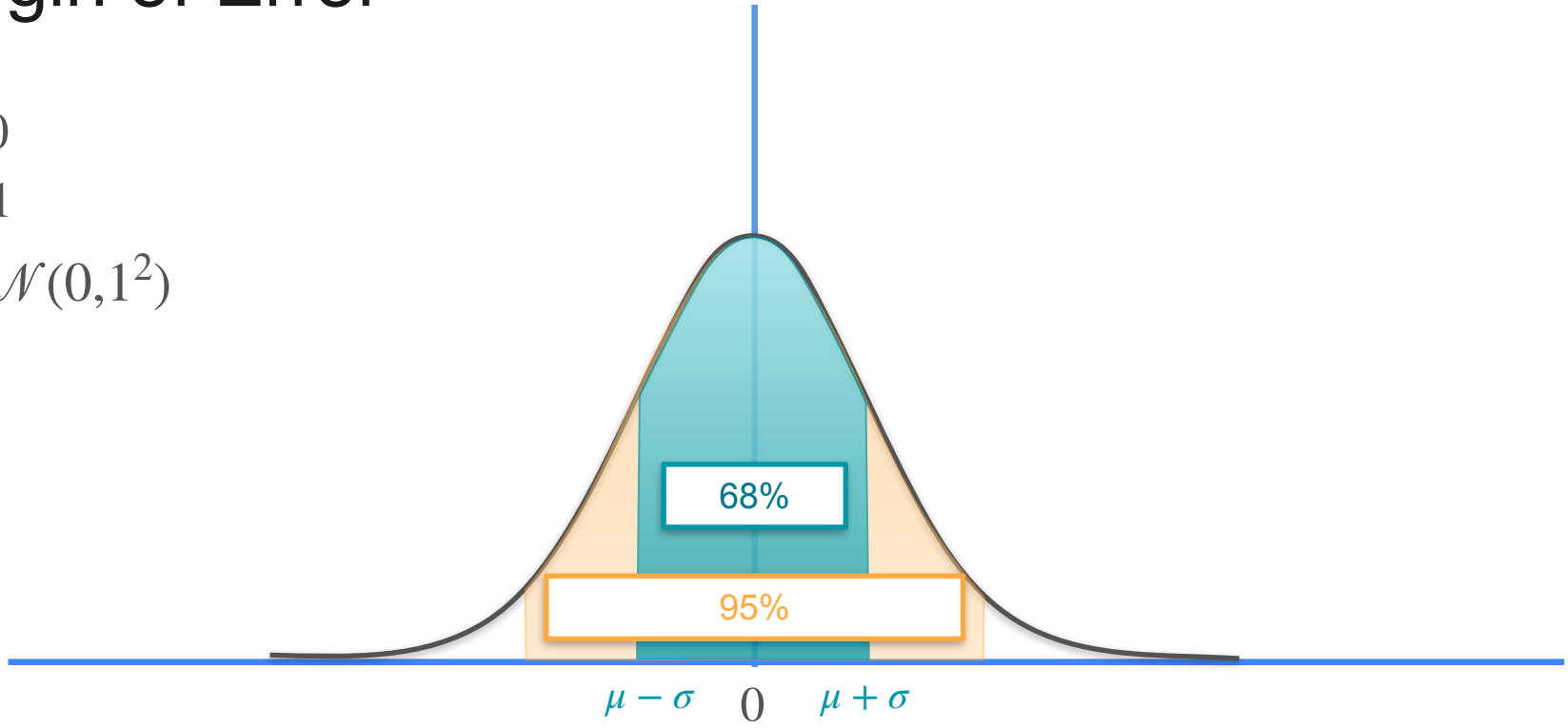

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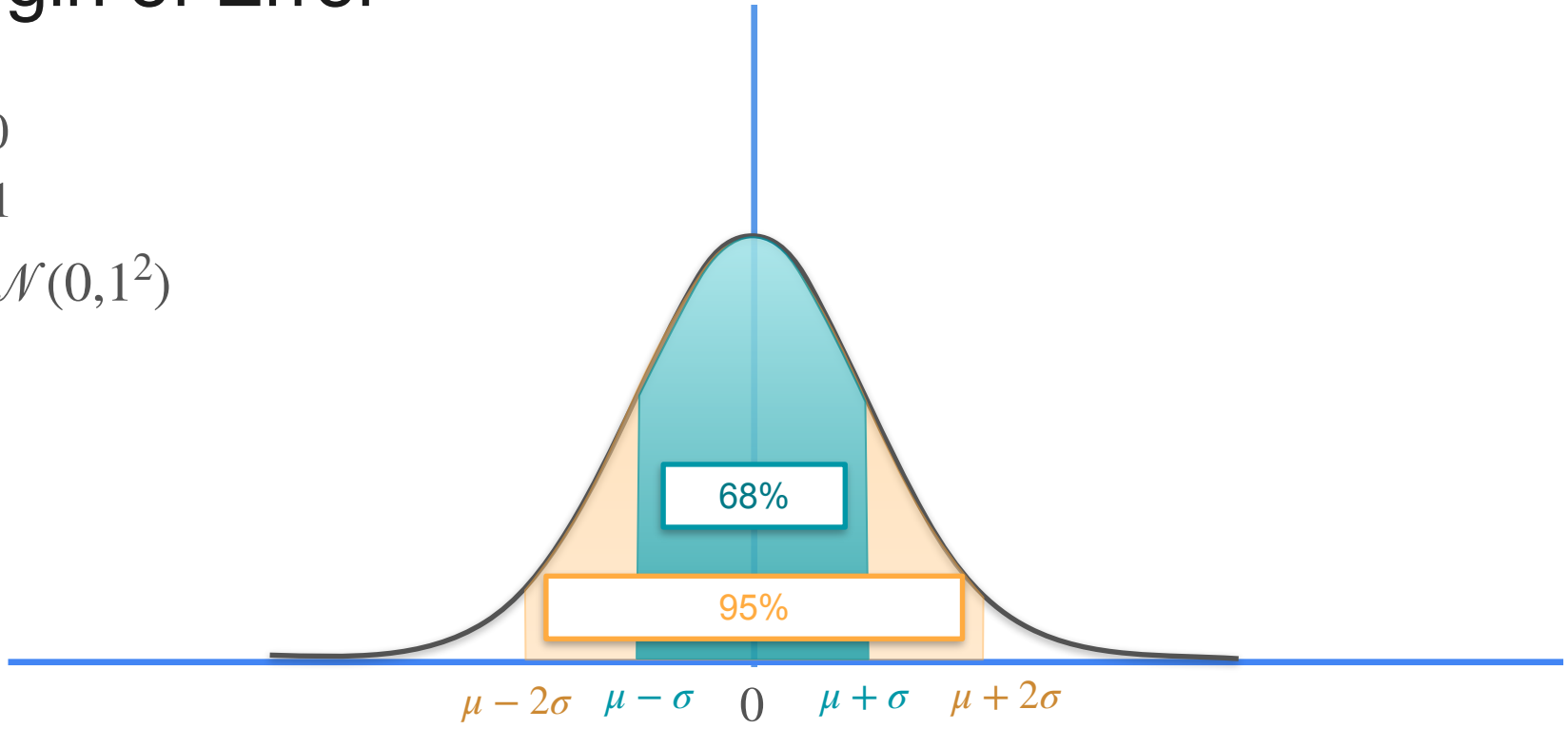

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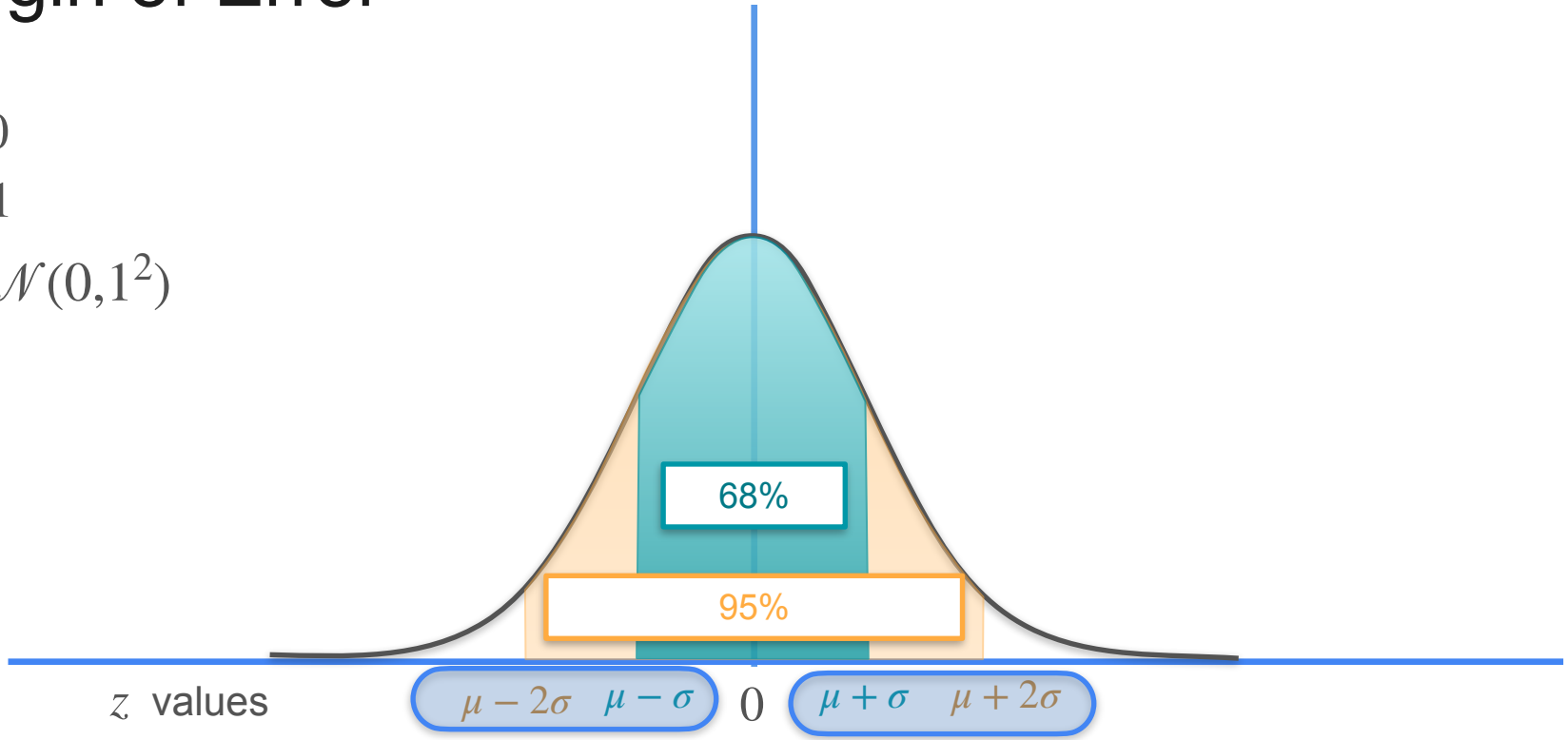

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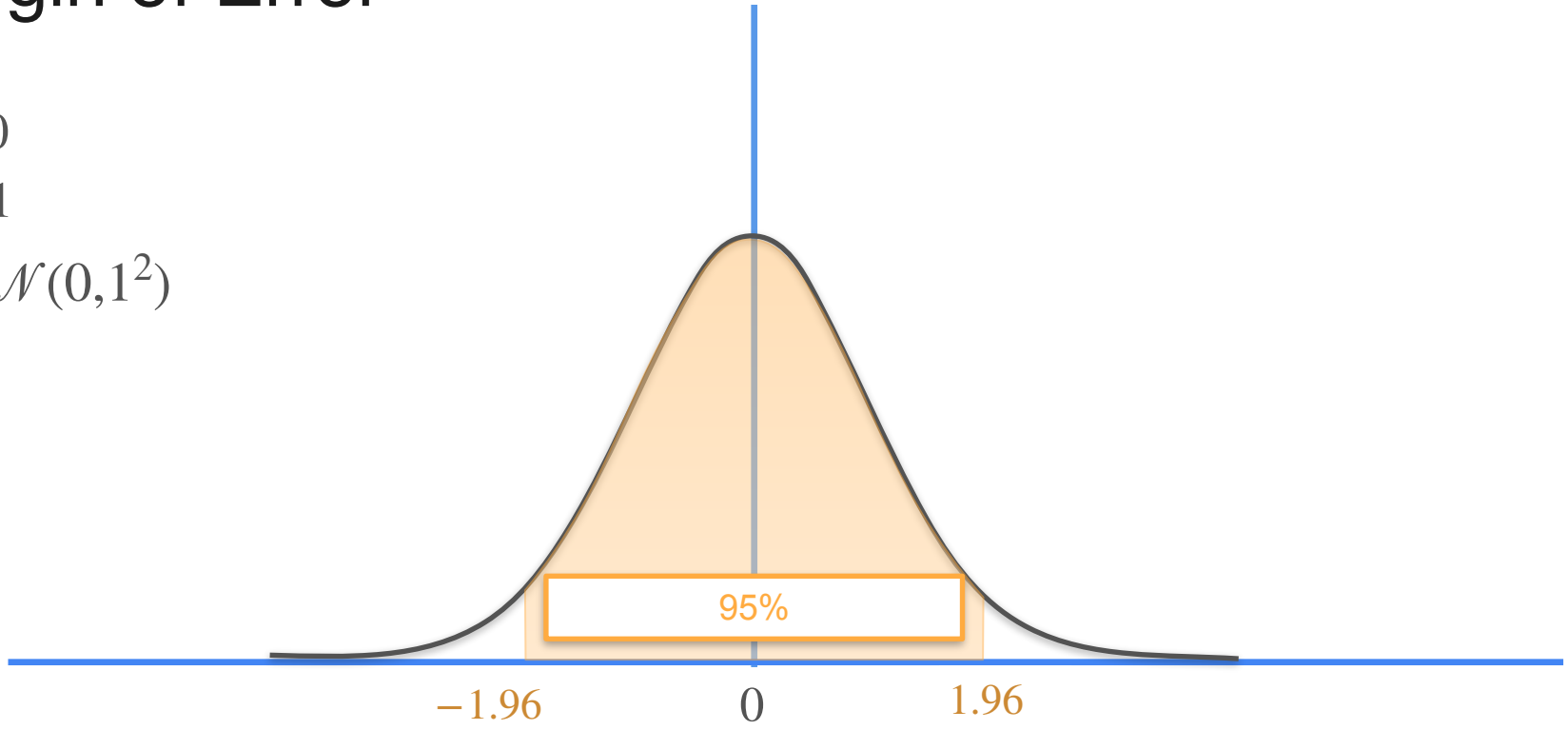

Margin of Error

$$\mu = 0$$
$$\sigma = 1$$
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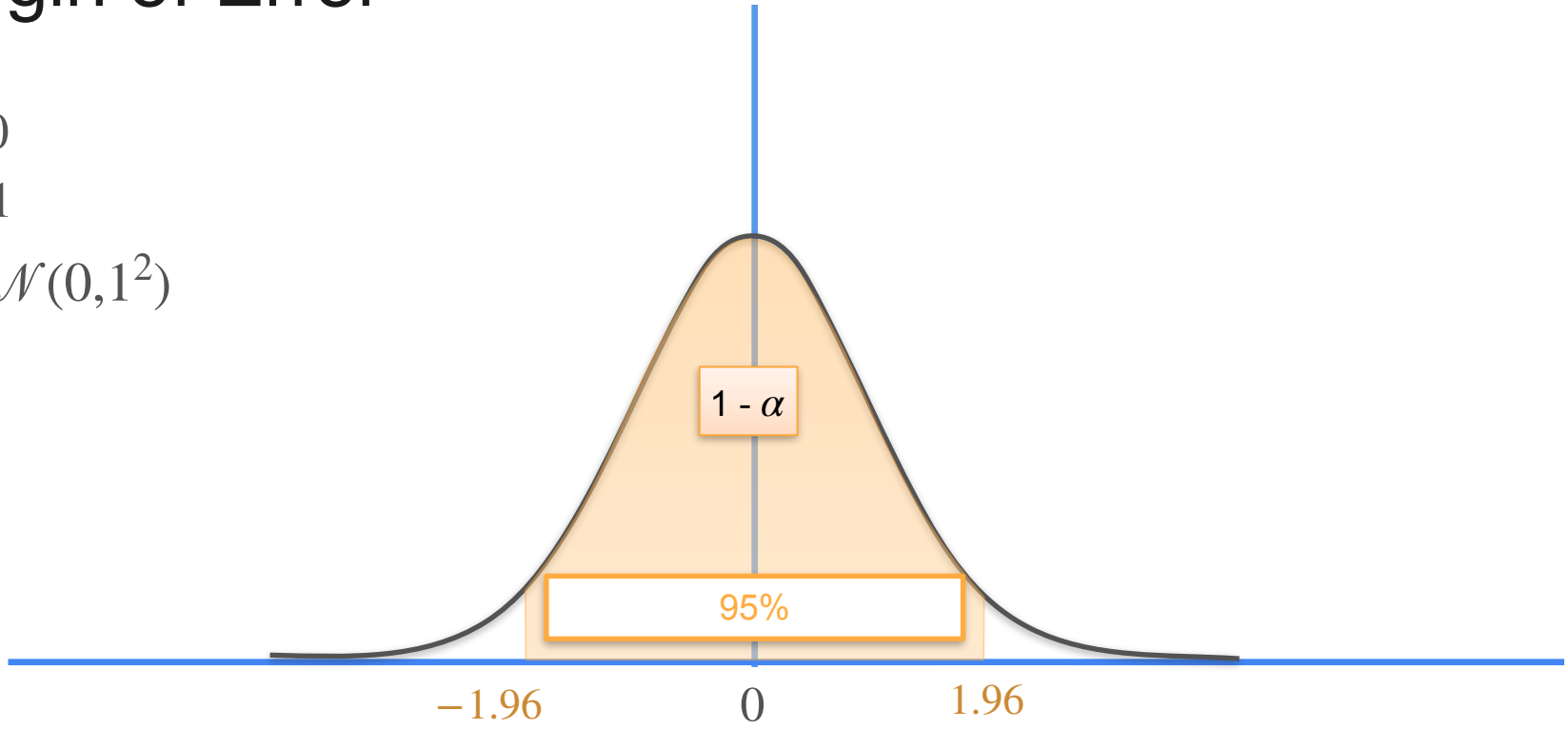

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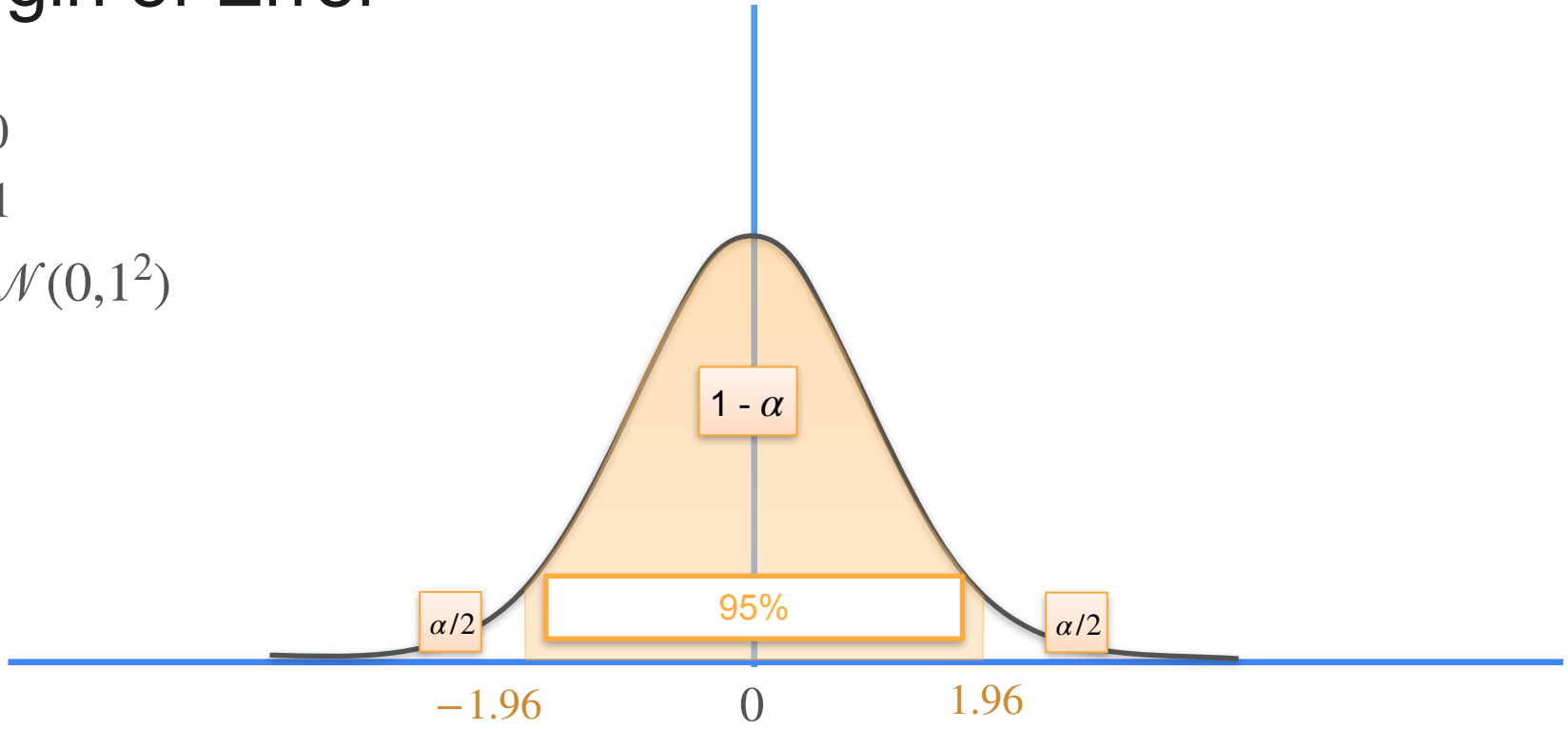

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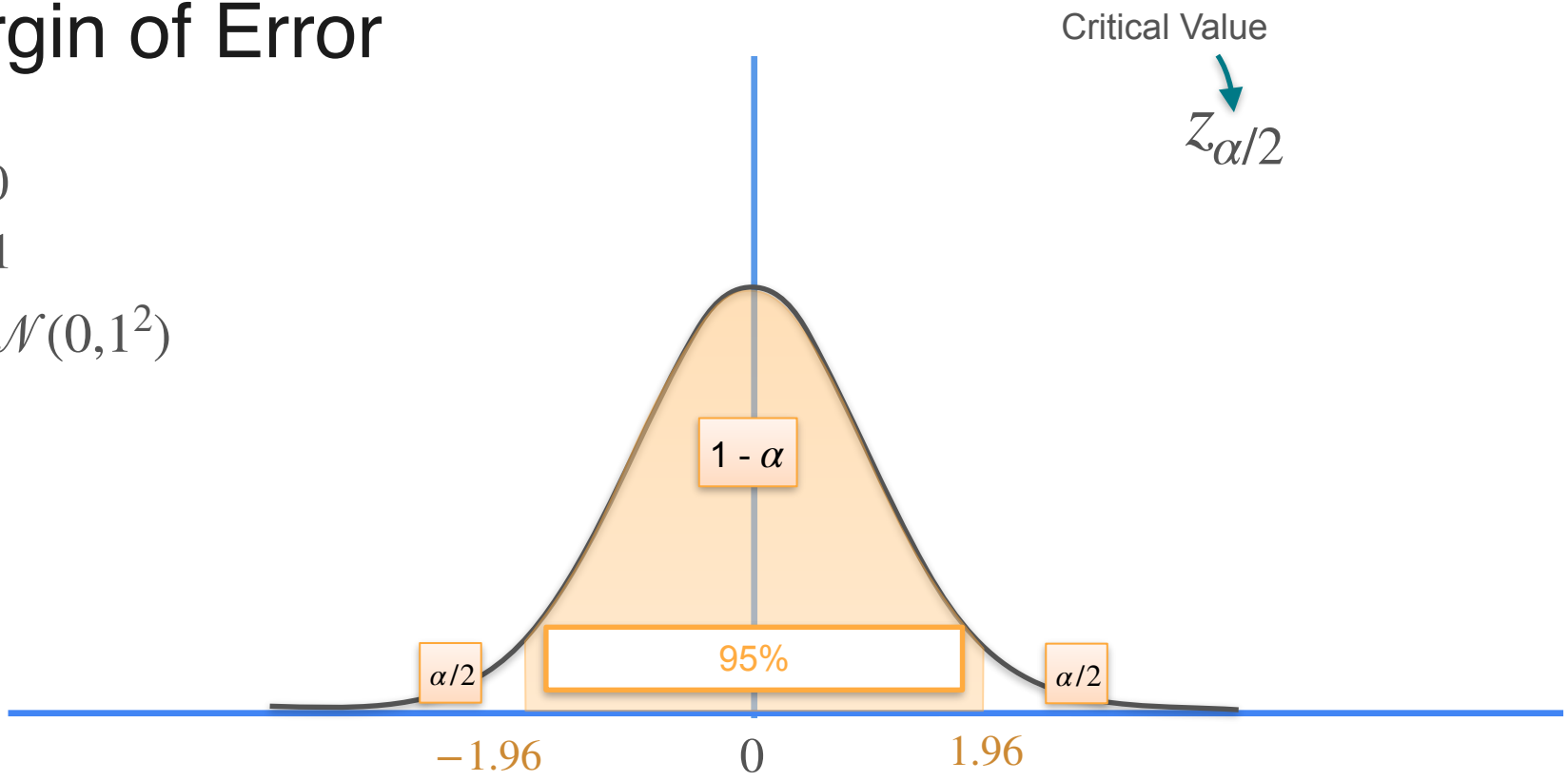

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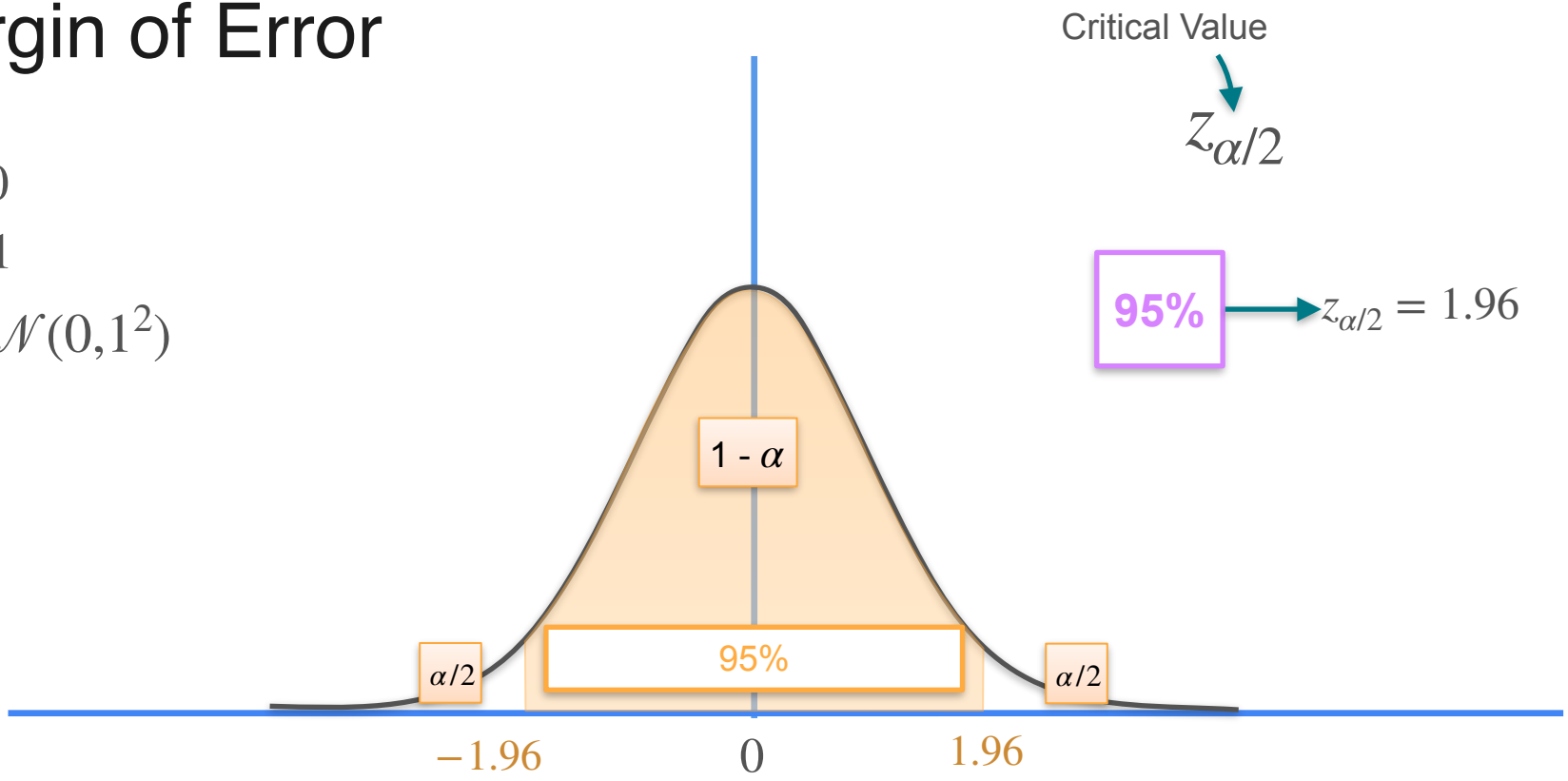
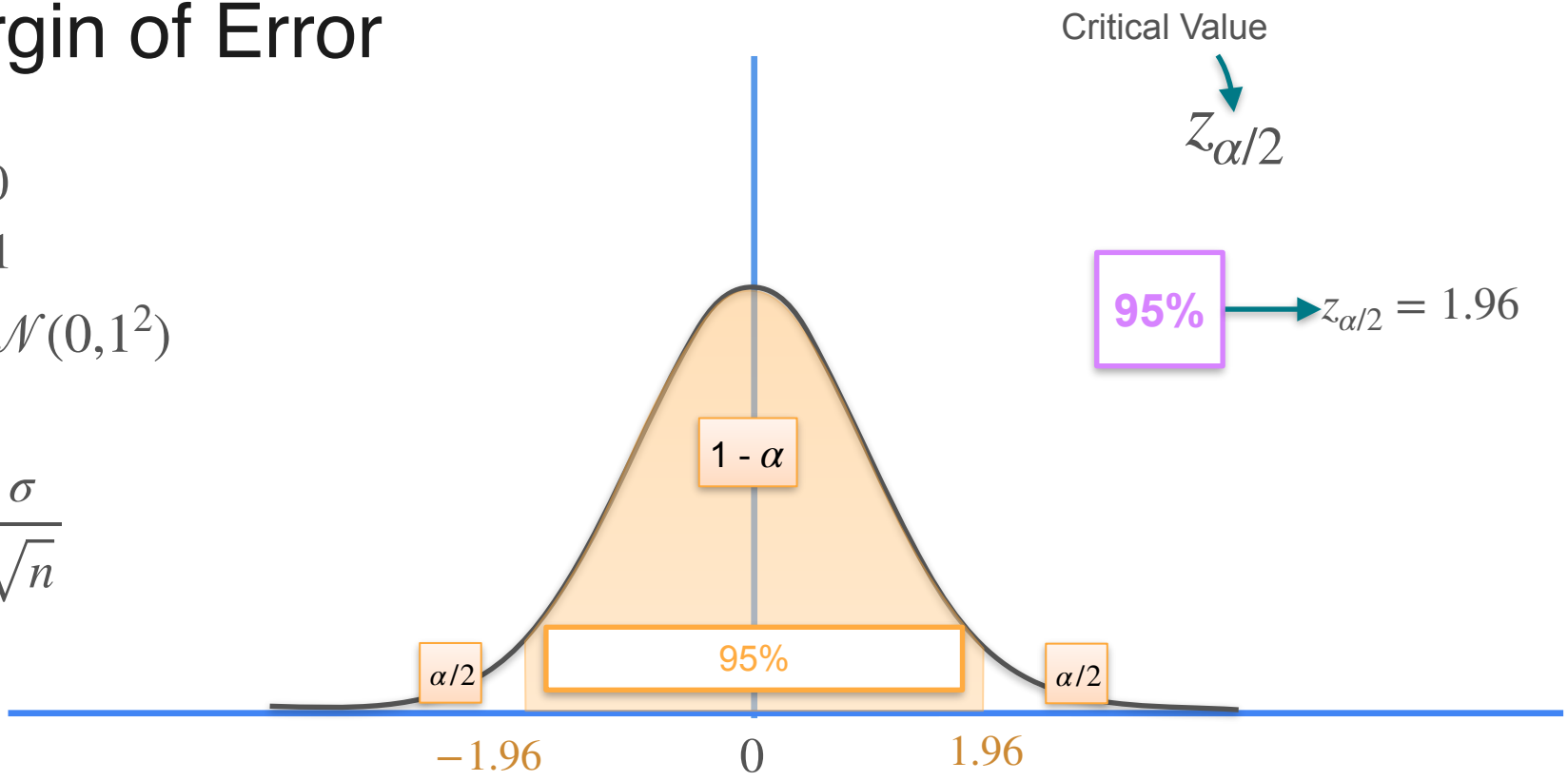


Margin of Error

$$\mu = 0$$
$$\sigma = 1$$
$$\bar{X} \sim \mathcal{N}(0, 1^2)$$

$$\sigma_{\bar{x}} = \frac{\sigma}{\sqrt{n}}$$



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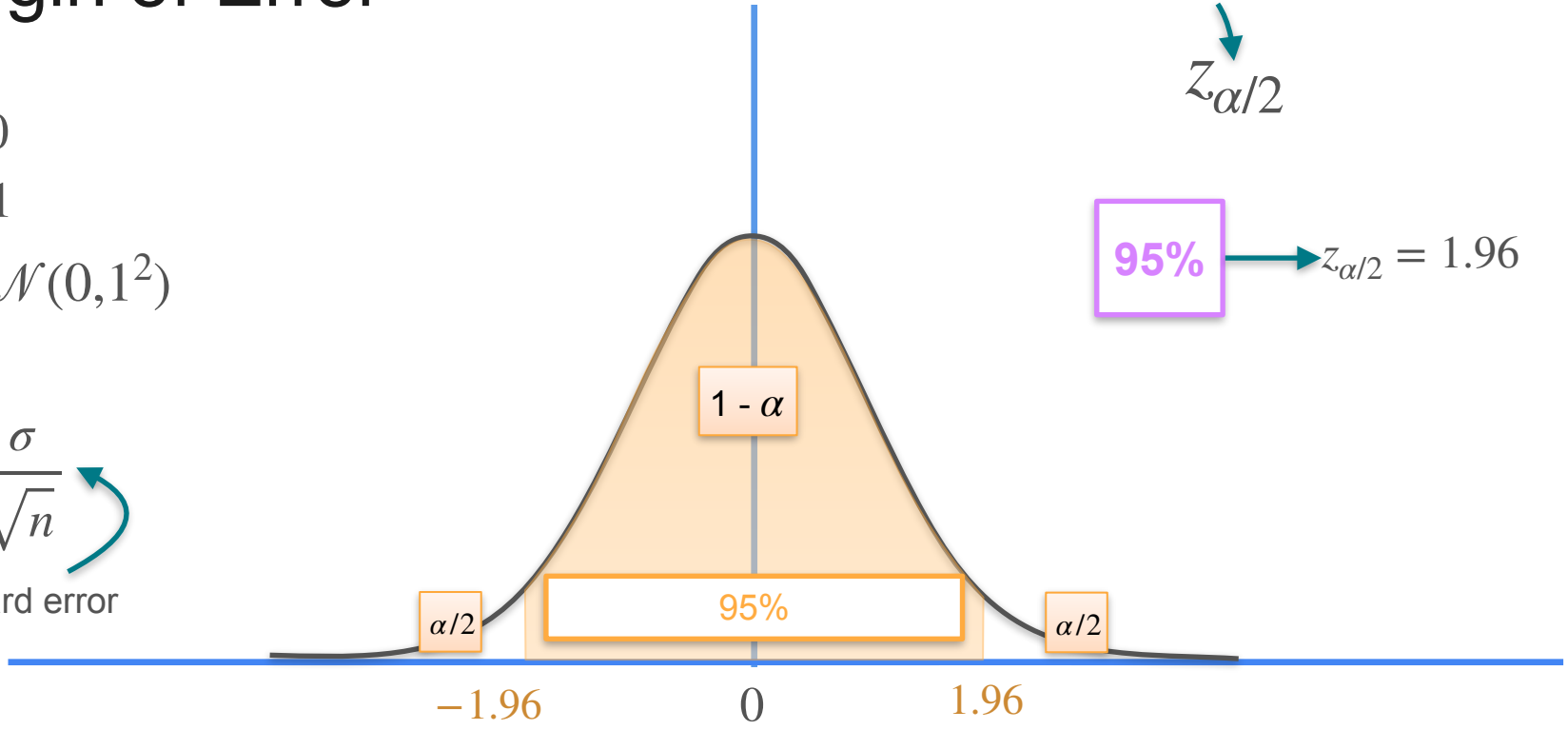
Standard error



Margin of Error

Critical Value

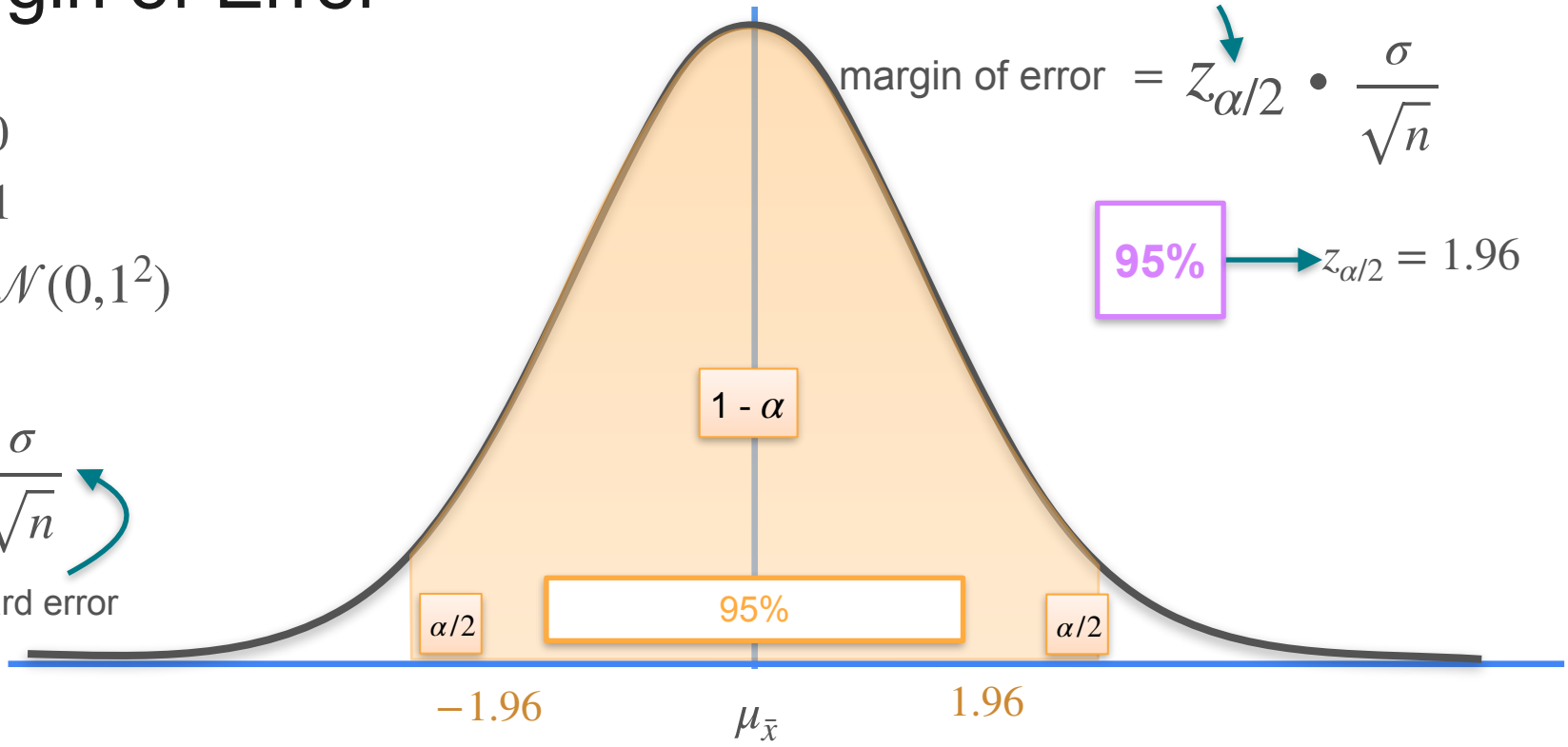
$$\text{margin of error} = z_{\alpha/2} \cdot \frac{\sigma}{\sqrt{n}}$$

$$\mu = 0$$
$$\sigma = 1$$
$$\bar{X} \sim \mathcal{N}(0, 1^2)$$

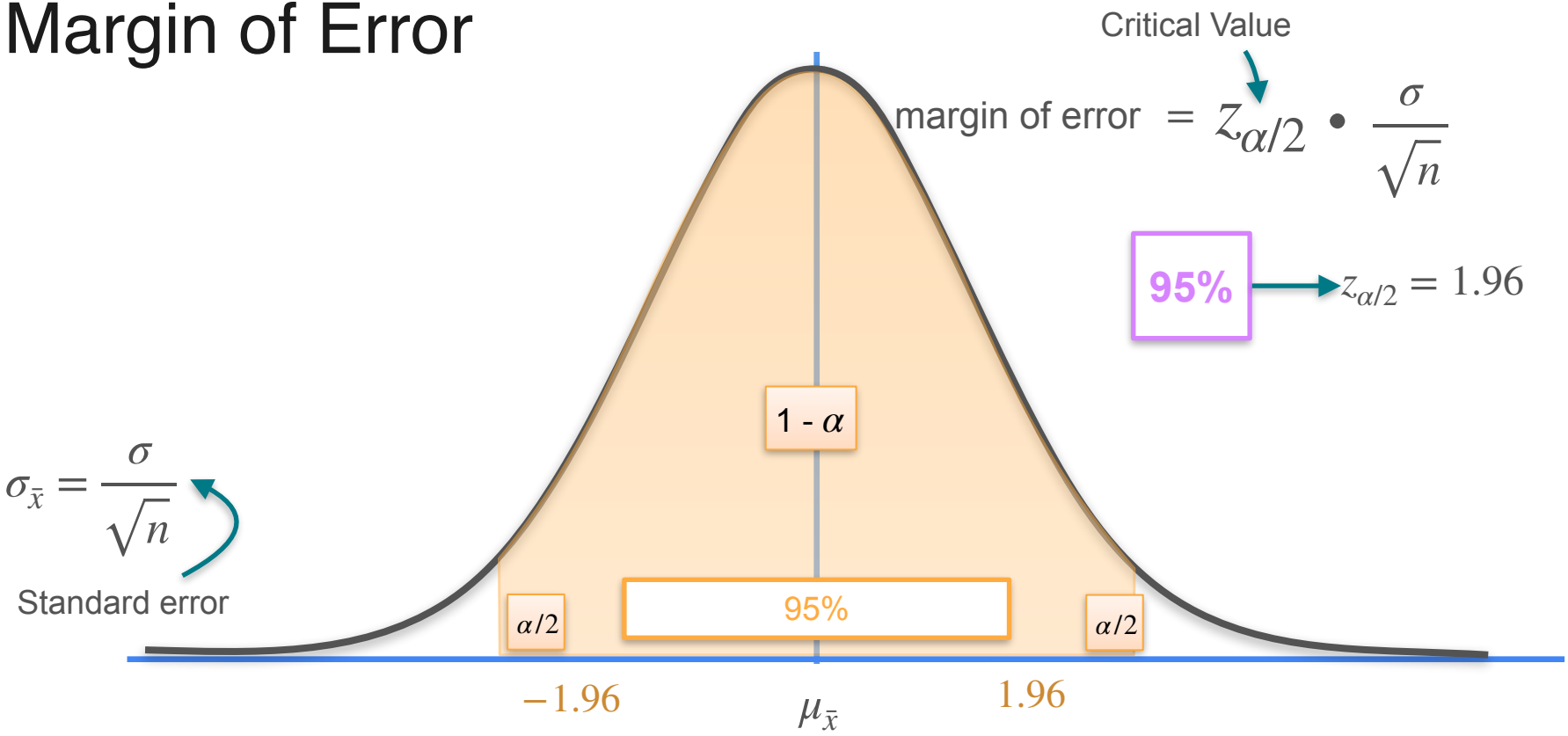
95% → $z_{\alpha/2} = 1.96$

$$\sigma_{\bar{x}} = \frac{\sigma}{\sqrt{n}}$$

Standard error



Margin of Error



Margin of Error

$$\mu_{\bar{x}} = \mu$$

$$\bar{X} \sim \mathcal{N}\left(\mu_{\bar{x}}, \frac{\sigma^2}{n}\right)$$

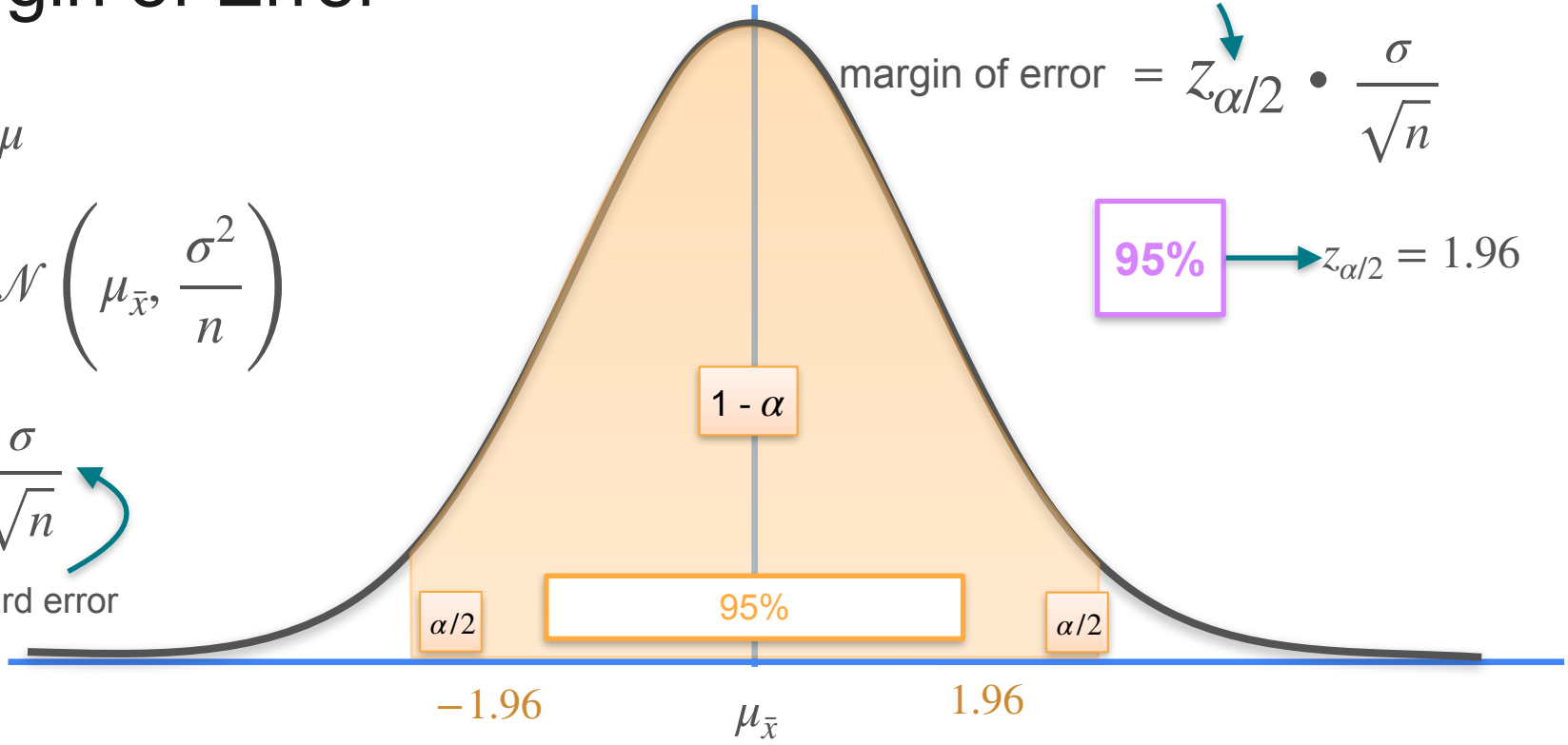
$$\sigma_{\bar{x}} = \frac{\sigma}{\sqrt{n}}$$

Standard error

Critical Value

$$\text{margin of error} = z_{\alpha/2} \cdot \frac{\sigma}{\sqrt{n}}$$

95% → $z_{\alpha/2} = 1.96$



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Standard error

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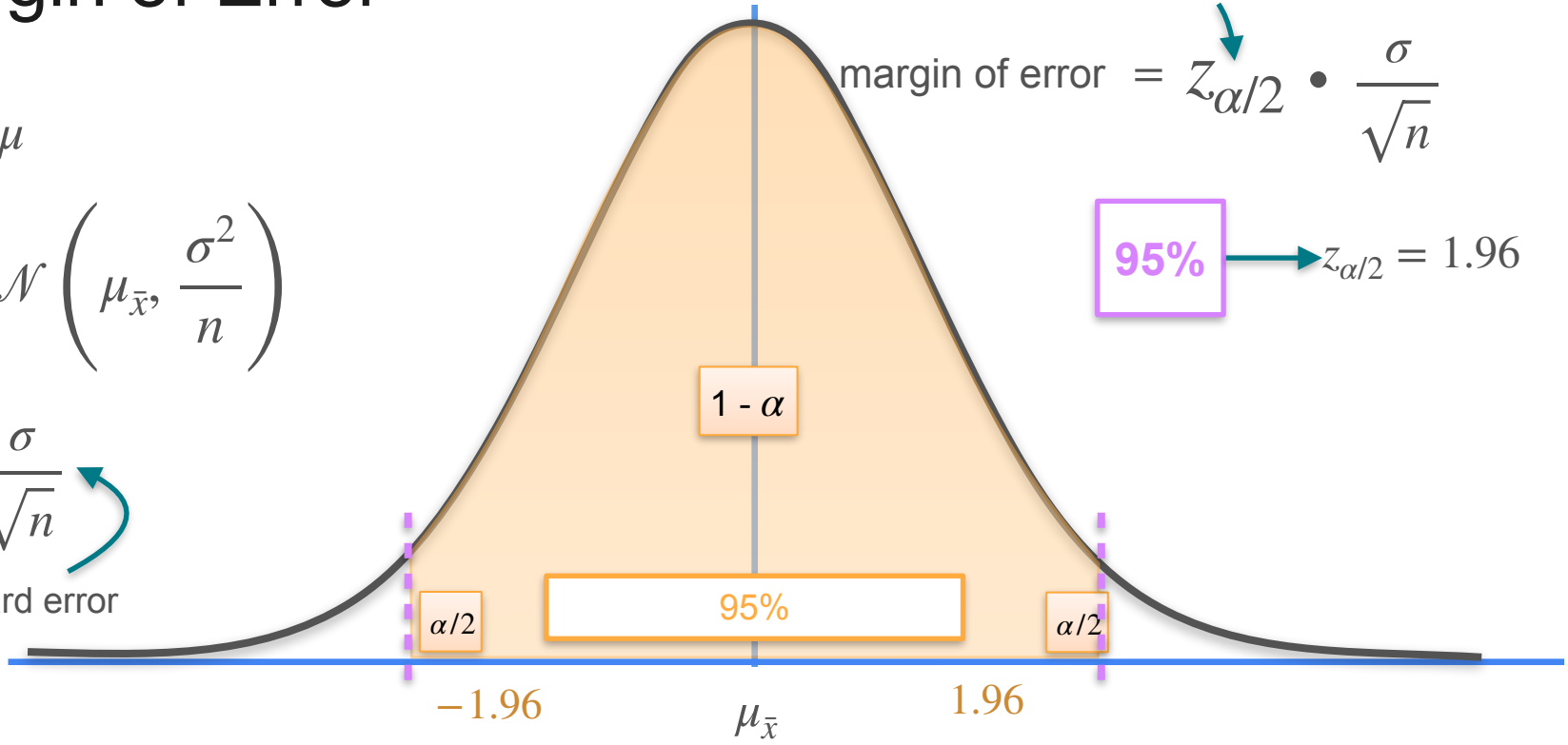

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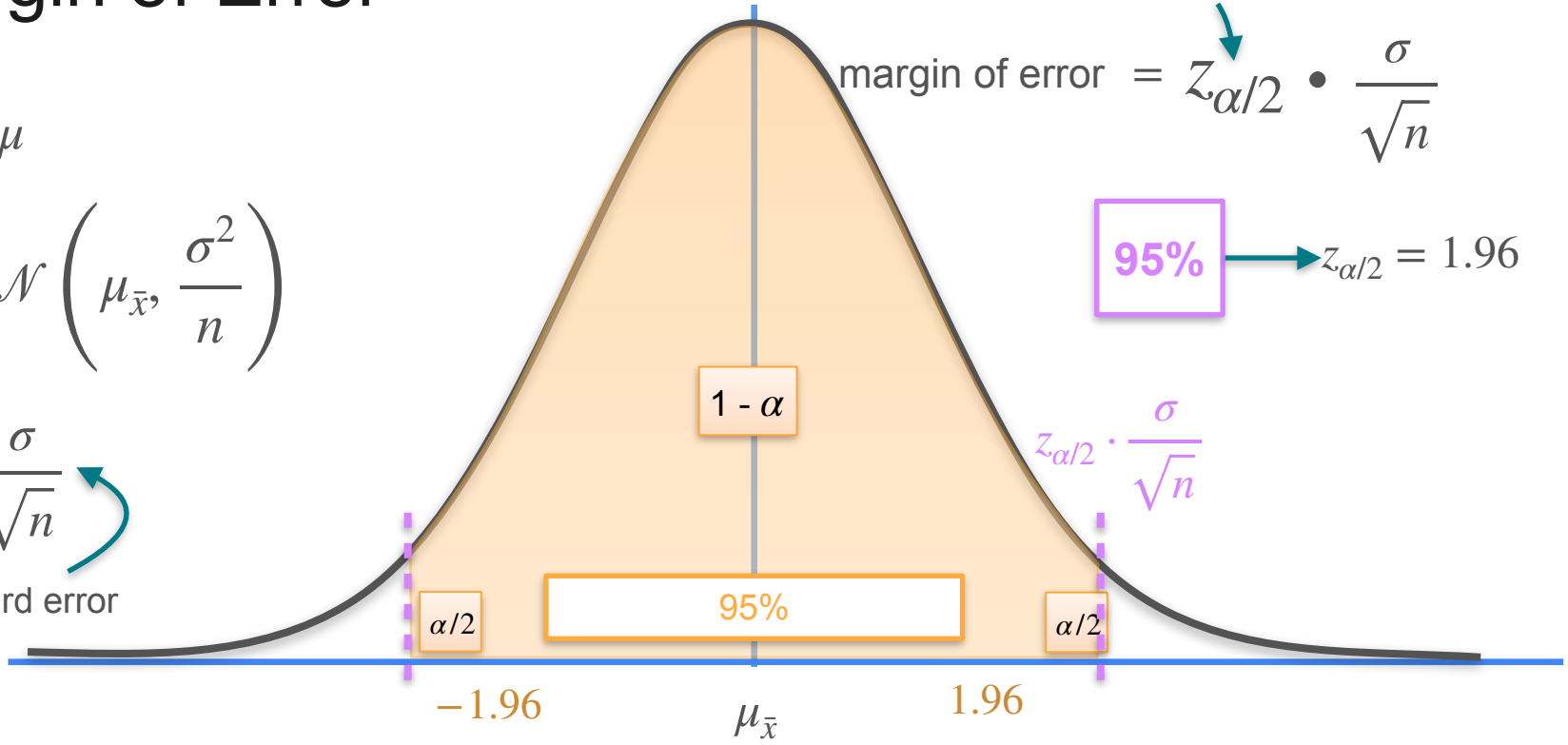
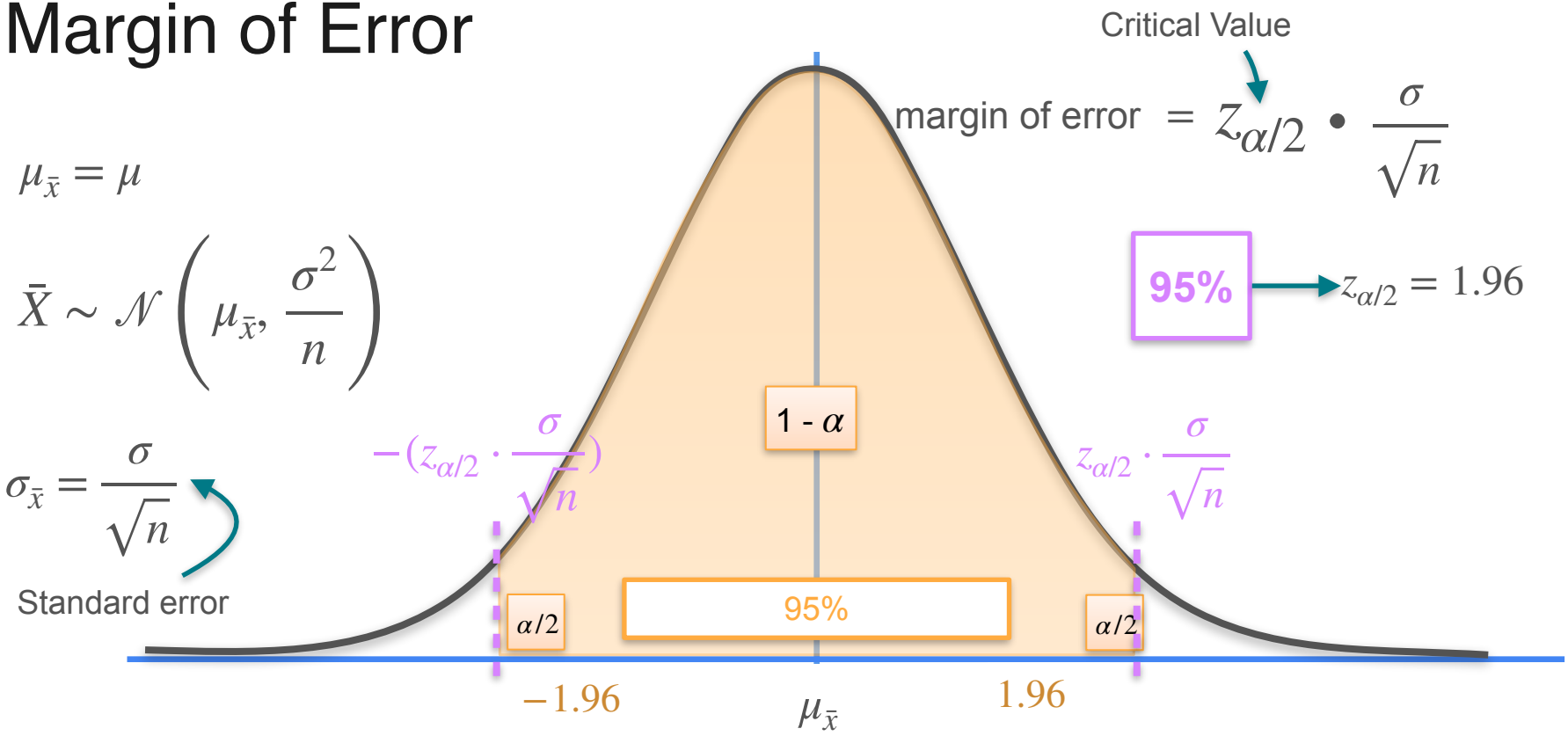
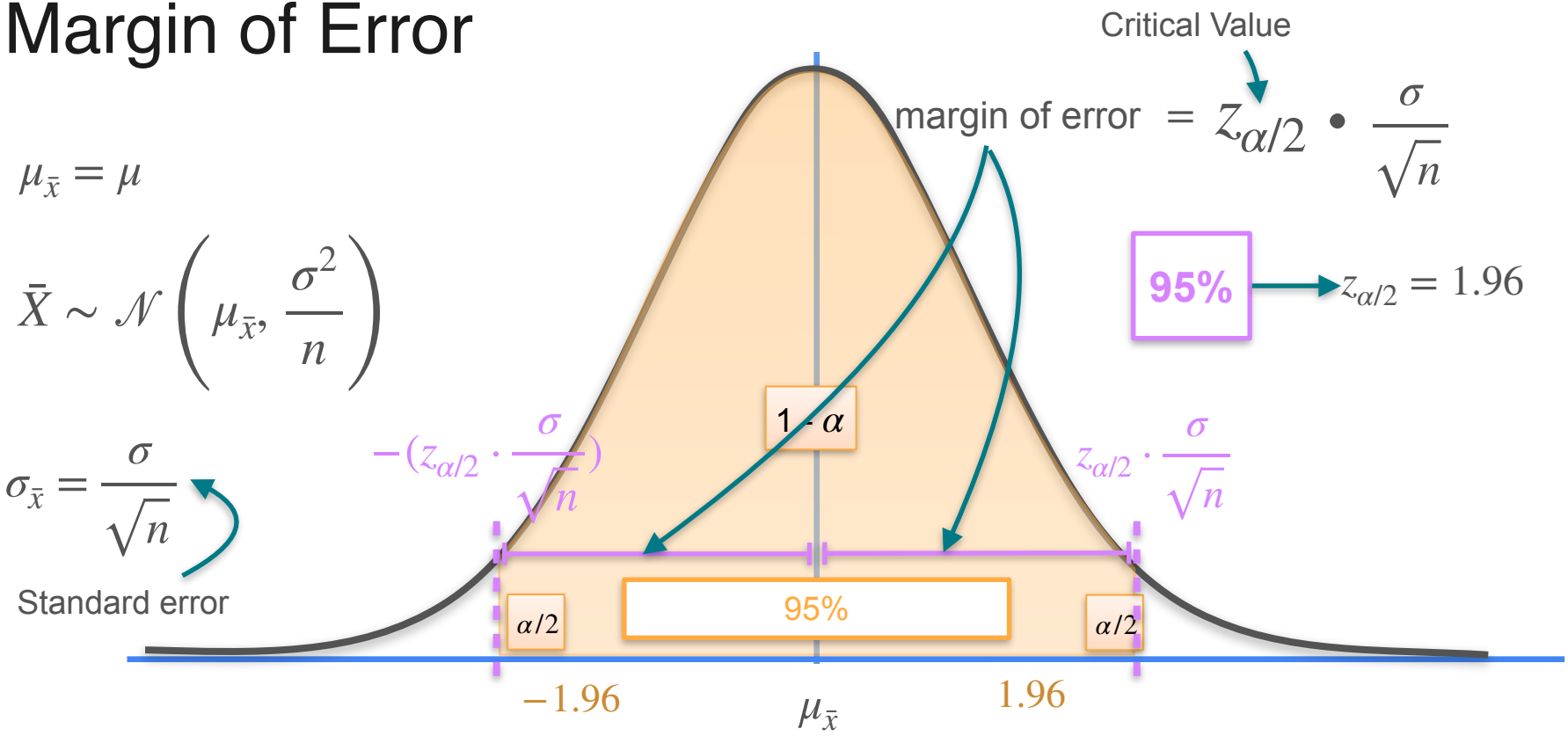


Margin of Error



Margin of Error



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Confidence Interval

Confidence Interval - Calculation Steps

Confidence Interval - Calculation Steps

STEPS:

Confidence Interval - Calculation Steps

STEPS:

- Find the sample mean

Confidence Interval - Calculation Steps

STEPS:

- Find the sample mean

$$\bar{x}$$

Confidence Interval - Calculation Steps

STEPS:

- Find the sample mean
- Define a desired confidence level (1 - α)

$\bar{x}$

Confidence Interval - Calculation Steps

STEPS:

- Find the sample mean
- Define a desired confidence level (1 - α)

$\bar{x}$

95%

Confidence Interval - Calculation Steps

STEPS:

- Find the sample mean
- Define a desired confidence level (1 - α)
- Get the critical value ($z_{\alpha/2}$)

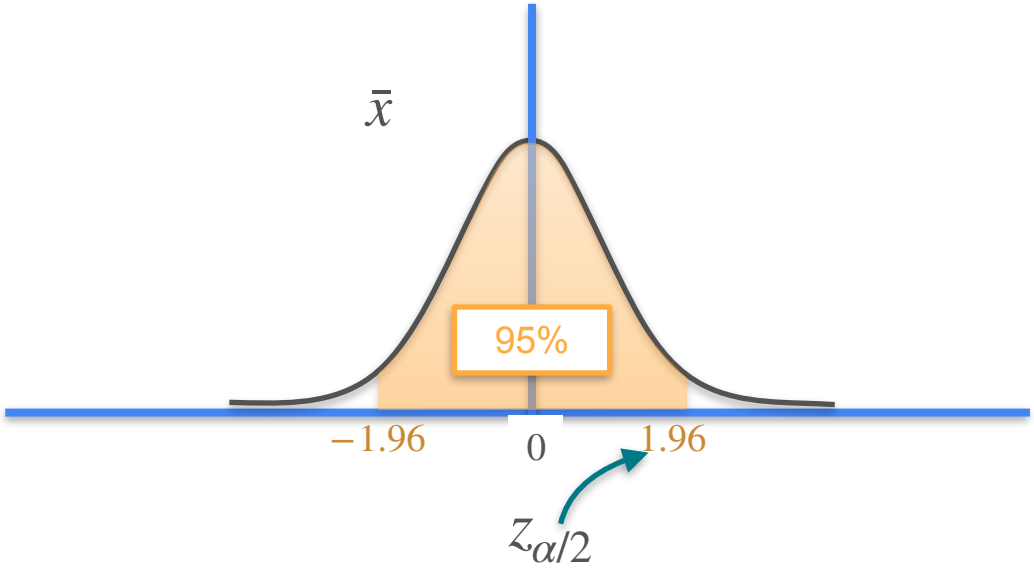
$\bar{x}$

95%

Confidence Interval - Calculation Steps

STEPS:

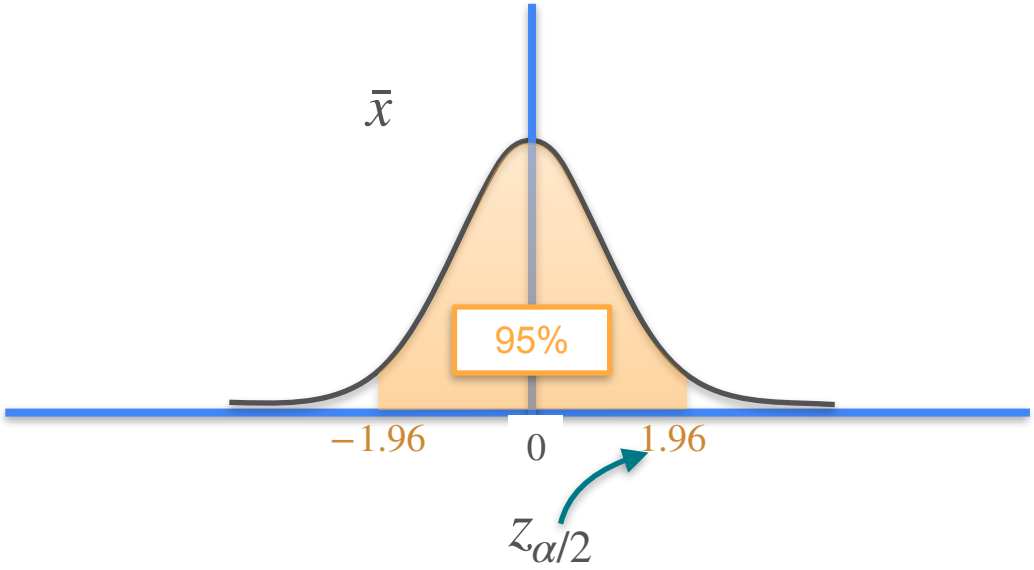
- Find the sample mean
- Define a desired confidence level (1 - α)
- Get the critical value ($z_{\alpha/2}$)



Confidence Interval - Calculation Steps

STEPS:

- Find the sample mean
- Define a desired confidence level (1 - α)
- Get the critical value ($z_{\alpha/2}$)
- Find the standard error ($\frac{\sigma}{\sqrt{n}}$)



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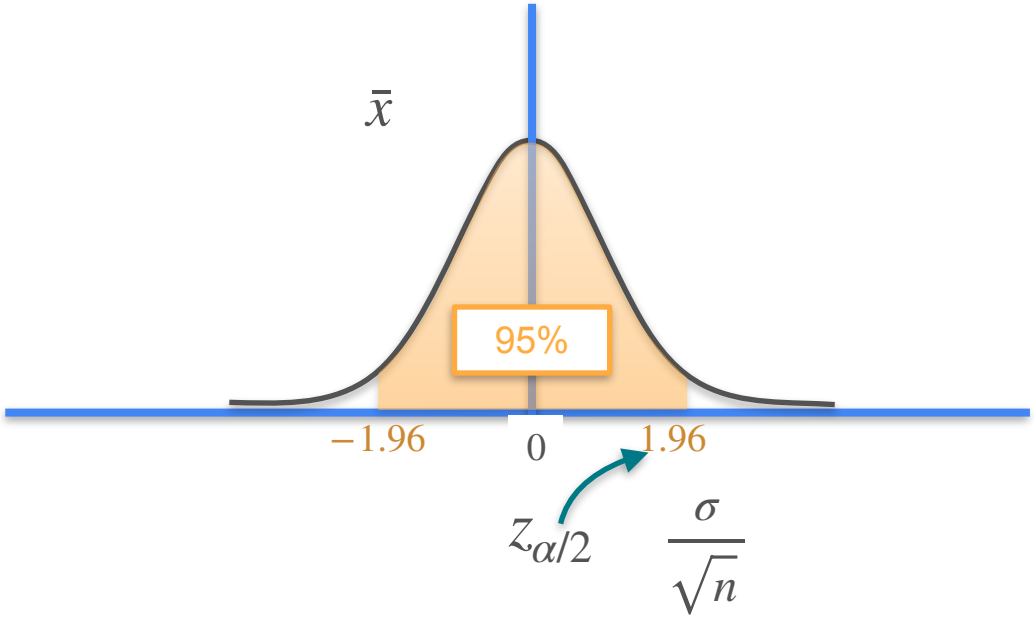
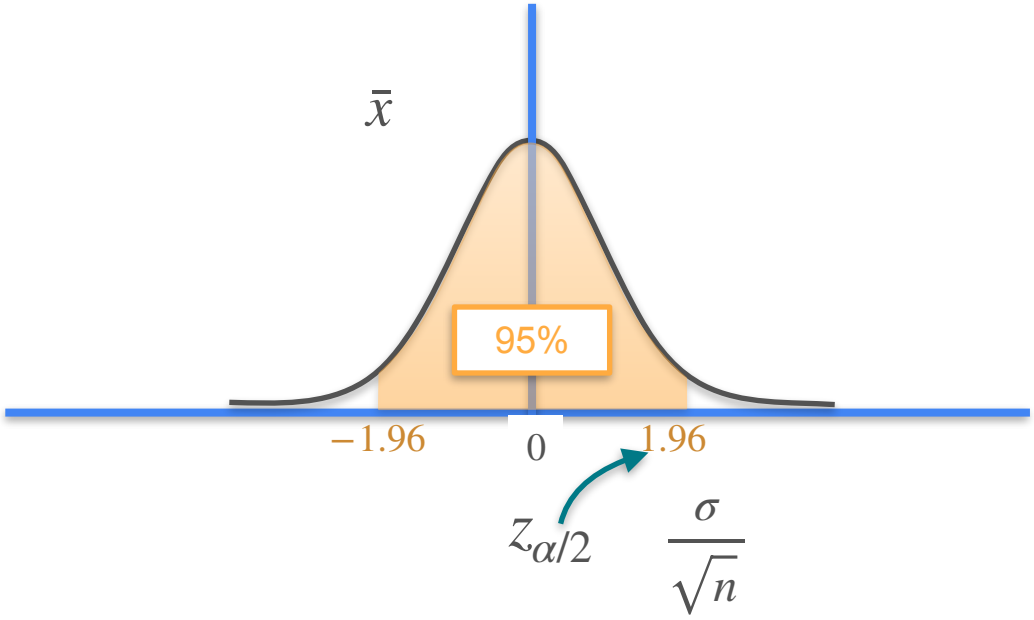


Confidence Interval - Calculation Steps

STEPS:

- Find the sample mean
- Define a desired confidence level (1 - α)
- Get the critical value ($z_{\alpha/2}$)
- Find the standard error ($\frac{\sigma}{\sqrt{n}}$)
- Find the margin of error



Confidence Interval - Calculation Steps

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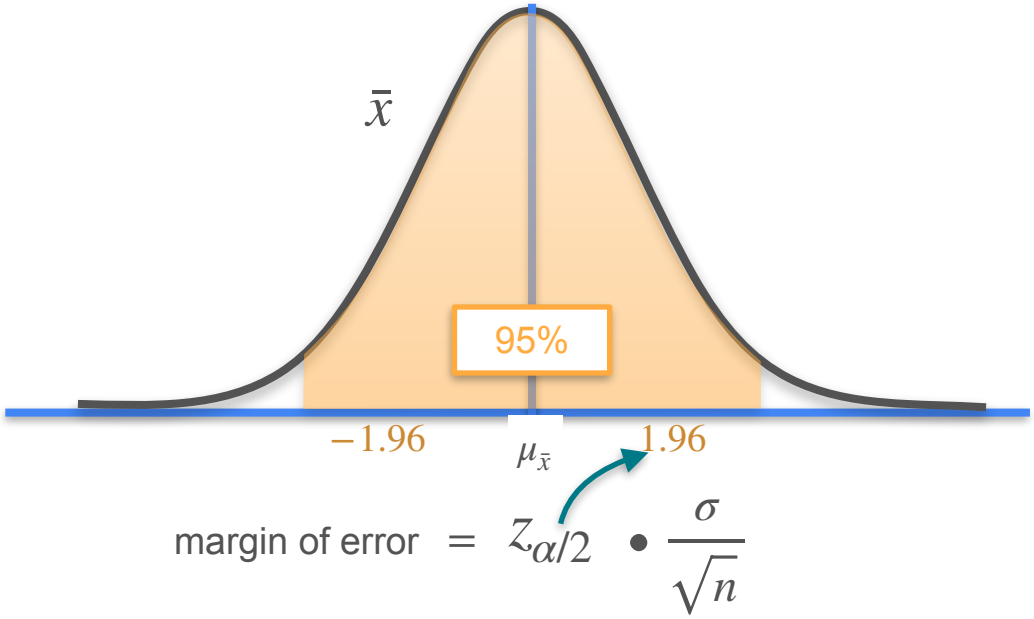

Confidence Interval - Calculation Steps

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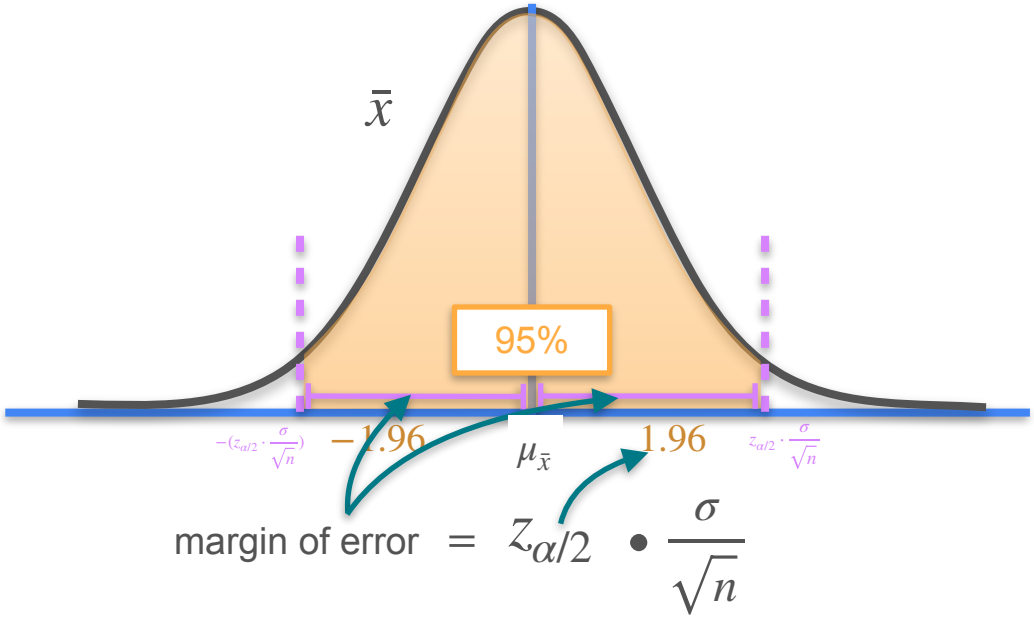

Confidence Interval - Calculation Steps

STEPS:

- Find the sample mean
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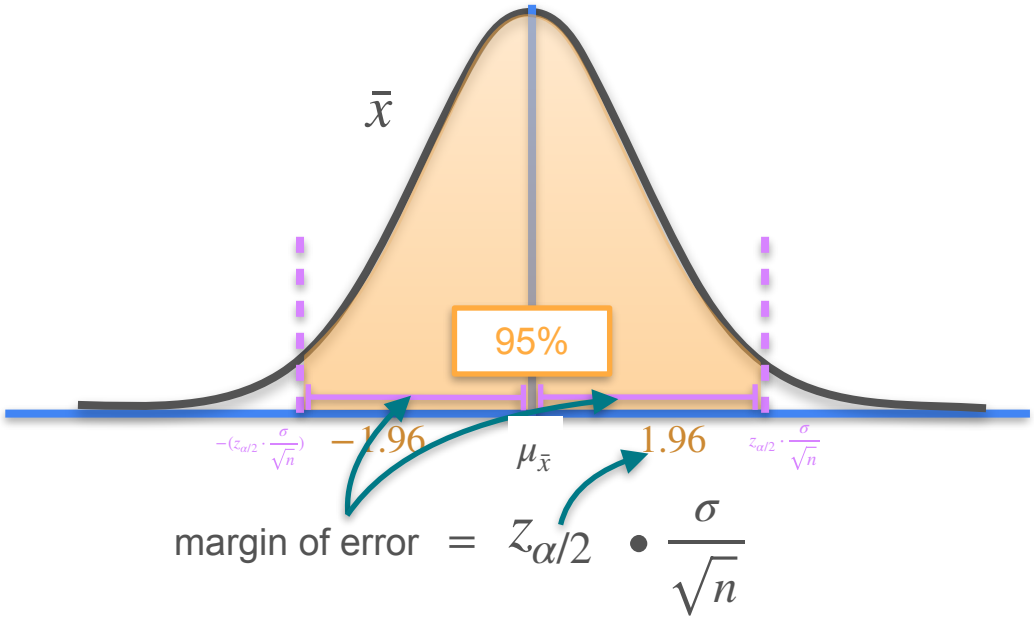
- Find the margin of error
- Add/subtract the margin of error to the sample mean



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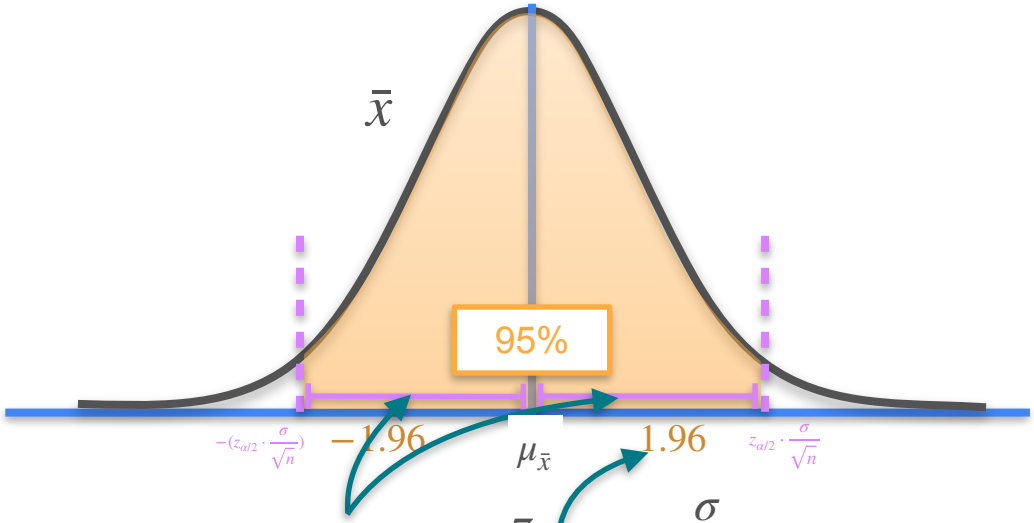

$$\text{margin of error} = z_{\alpha/2} \cdot \frac{\sigma}{\sqrt{n}}$$

$$\text{confidence interval} = \bar{x} \pm z_{\alpha/2} \cdot \frac{\sigma}{\sqrt{n}}$$

Confidence Interval - Calculation Steps

STEPS:

- Find the sample mean
- Define a desired confidence level (1 - α)
- Get the critical value ($z_{\alpha/2}$)
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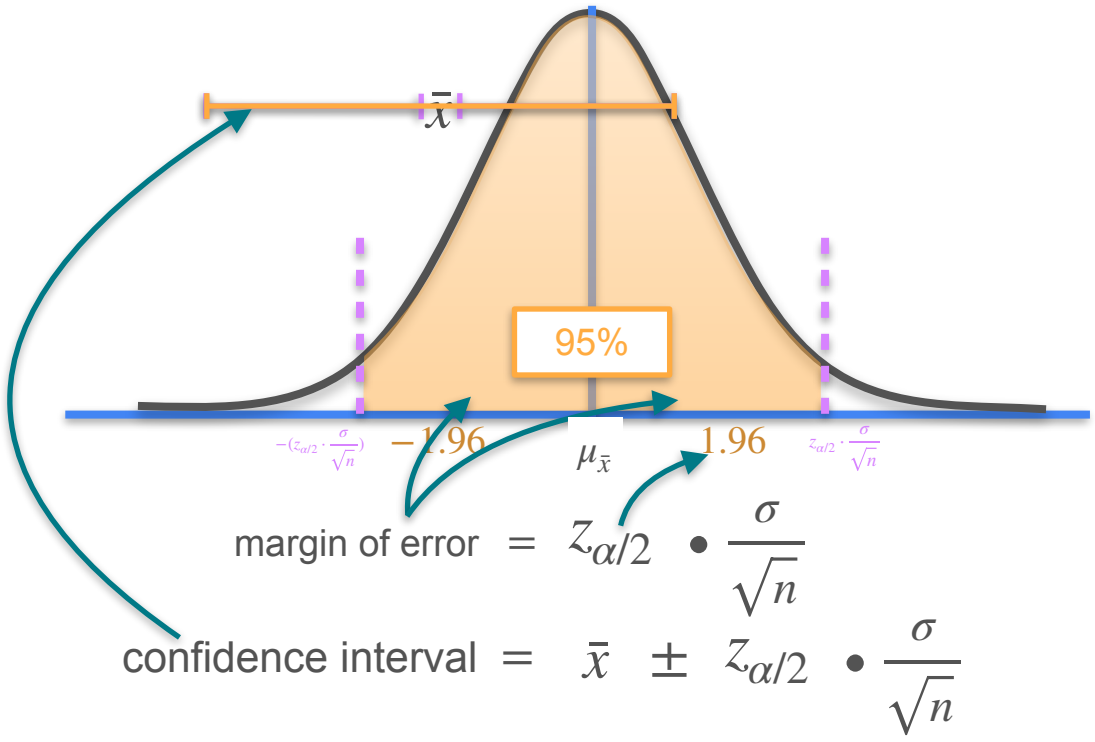

Confidence Interval - Calculation Steps

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$$\text{confidence interval} = \bar{x} \pm z_{\alpha/2} \bullet \frac{\sigma}{\sqrt{n}}$$

Confidence Interval - Calculation Steps

STEPS:

- Find the sample mean
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- Get the critical value ($z_{\alpha/2}$)
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- Add/subtract the margin of error to the sample mean

$$\text{confidence interval} = \bar{x} \pm z_{\alpha/2} \bullet \frac{\sigma}{\sqrt{n}}$$

Assumptions

Confidence Interval - Calculation Steps

STEPS:

- Find the sample mean
- Define a desired confidence level (1 - α)
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- Find the standard error ($\frac{\sigma}{\sqrt{n}}$)
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- Add/subtract the margin of error to the sample mean

$$\text{confidence interval} = \bar{x} \pm z_{\alpha/2} \bullet \frac{\sigma}{\sqrt{n}}$$

Assumptions

- Simple random sample

Confidence Interval - Calculation Steps

STEPS:

- Find the sample mean
- Define a desired confidence level (1 - α)
- Get the critical value ($z_{\alpha/2}$)
- Find the standard error ($\frac{\sigma}{\sqrt{n}}$)
- Find the margin of error
- Add/subtract the margin of error to the sample mean

$$\text{confidence interval} = \bar{x} \pm z_{\alpha/2} \bullet \frac{\sigma}{\sqrt{n}}$$

Assumptions

- Simple random sample
- Sample size > 30 or population is approximately normal

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Confidence Interval - Example