

# Introduction to **Statistics Hypothesis Testing**

# Hypothesis Testing

# What is Hypothesis?

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An idea or explanation of something that is based on a few known facts but that has not yet been proved to be true or correct.

-- Oxford Dictionary

# What is Hypothesis?

Testing a known assumption that is generally accepted as the truth.

Testing a claim that is supposed to change the current facts.

# Null Vs Alternate Hypothesis

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$H_0$

- There is no change from the stated facts.
- Chocolate bars weigh 100 gms or more

$=$

$\geq$

$\leq$

$H_a$

- The stated facts are incorrect
- Chocolate bars weigh less than 100 gms

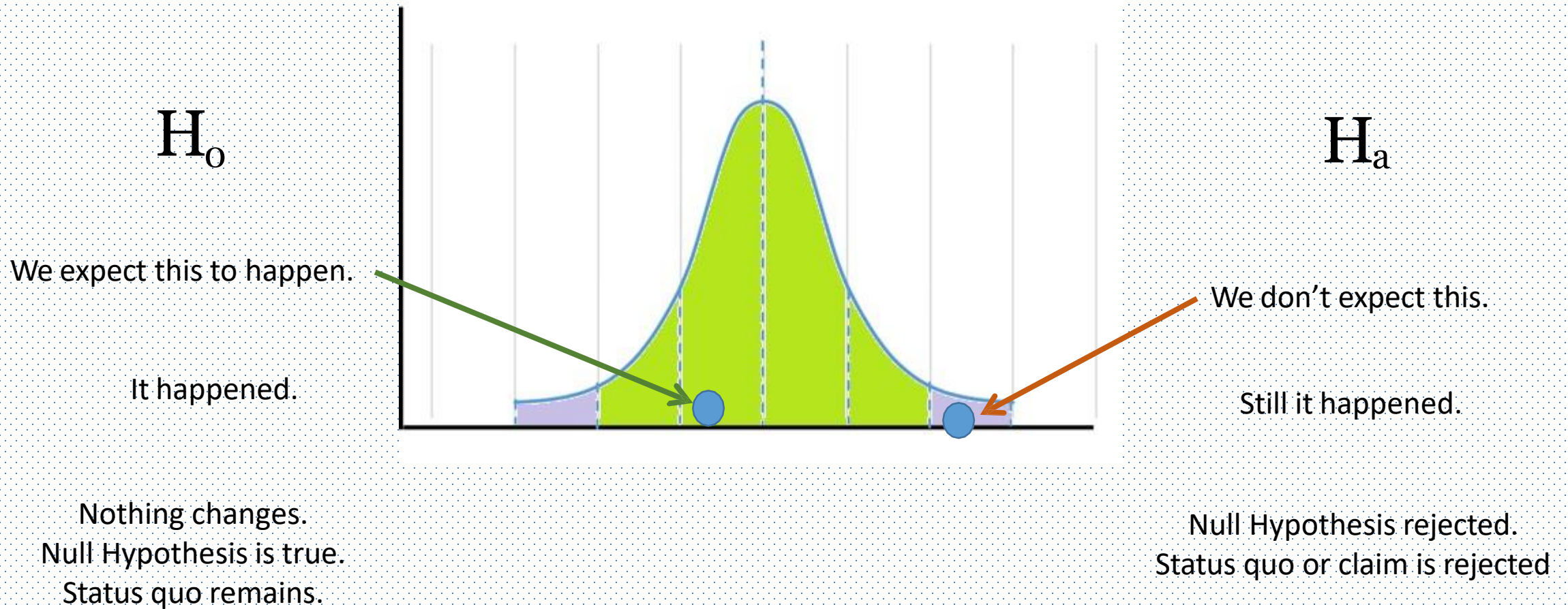
$\neq$

$<$

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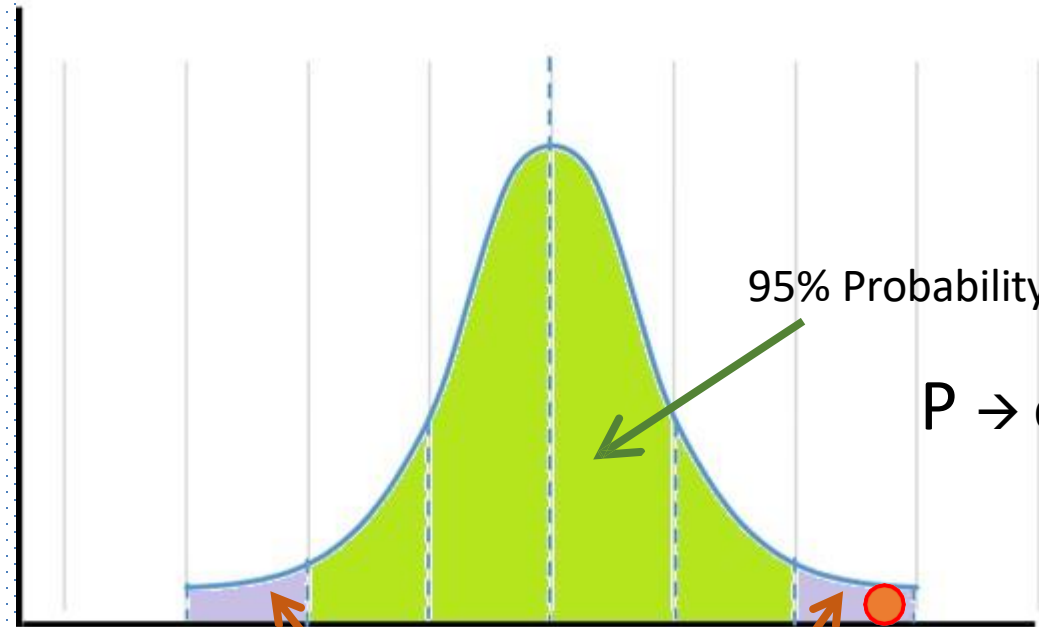
# Statistical Significance

# Statistical Significance



# Important terms - Statistical Significance

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$P \rightarrow$  Observed or seen Probability of the sample

$$P < \alpha$$

Reject Null Hypothesis

Rejection Region  
Probability of rejection region  $\rightarrow \alpha$



# Hypothesis Testing

Current average waiting period for the customers who call the customer service helpline is 100 seconds with a standard deviation of 20 seconds. Certain changes were recently done to the IVR menu options as well as the overall customer service processes. After a week, the management picked-up a sample of 100 calls and found that the average waiting period was 95 seconds. Have the process implementations resulted in the waiting period reduction?

$H_o$  : null hypothesis : There is no change in the waiting period.

$H_a$  : alternate hypothesis : The waiting period has reduced.

Significance Level;  $\alpha = 0.05$  or 5%

1. State Population parameters and Sample statistics

$$\mu = 100; \quad \sigma = 20; \quad N = 100; \quad \bar{X} = 95;$$

2. Compute Sample Standard Deviation and Z-Value

$$\sigma_{\bar{x}} = \frac{\sigma}{\sqrt{n}} \qquad Z = \frac{\bar{x} - \mu}{\sigma_{\bar{x}}}$$

3. Compute  $\rho$  using Z-Score for the Z-value

$$\rho = 0.62\%$$

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$$\rho < \alpha$$

Reject Null

Population parameters and Sample statistics

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Compute Sample Standard Deviation and Z-Value

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Thank You!