

KEY

Note: The consequences listed are not a complete list. Other consequences are possible.

Directions: For scenarios 1 - 4, describe both Type I and Type II errors and describe a potential consequence.

Scenario 1:

A clinical trial of a medical treatment designed to help patients get better

Null: Treatment doesn't work

Alternative: Treatment does work

Type I: Rejecting null, when null is true

Thinking treatment does work, when it in fact does not work

Consequence: Give the treatment to patients and they do not get better

Type II: Not rejecting the null, when the null is false

Thinking the treatment does not work, when it does work

Consequence: Spending more money on research for new treatments

Scenario 2: A fire alarm is designed to make a loud noise when there is a fire.

Null: There is no fire.

Alternative: There is a fire.

Type I: Rejecting null, when null is true

Thinking there is a fire when there is no fire.

Consequence: Evacuating the building when it wasn't necessary.

Type II: Not rejecting the null, when the null is false

Thinking there is no fire, when there is a fire.

Consequence: Not everyone gets out of the building safely, injuries due to smoke and burns

Scenario 3: A coin is used to determine which football team will choose to kick or receive.

Null: The coin is fair

Alternative: The coin is not fair

Type I: **Rejecting null, when null is true**

Thinking the coin is not fair, when it is a fair coin.

Consequence: **An unnecessary expensive investigation where a team gets fined**

Type II: **Not rejecting the null, when the null is false**

Thinking the coin is a fair coin, when it is not a fair coin.

Consequence: **The wrong team gets to choose to kick or receive and has an advantage.**

Scenario 4: A blood test is designed to detect a disease

Null: Patient does not have disease

Alternative: Patient has disease

Type I: **Rejecting null, when null is true**

Thinking the patient has the disease, when they do not (also called a false positive)

Consequence: **The patient is worried and has to pay for more testing.**

Type II: **Not rejecting the null, when the null is false**

Thinking the patient does not have the disease, when they do have the disease (also called a false negative)

Consequence: **The disease gets worse and is more expensive to treat later on**

For scenario 5 and 6, identify the error (Type I or Type II) and describe a potential consequence.

Scenario 5: A fire breaks out and the alarm doesn't ring.

Null: There is no fire.

Alternative: There is a fire.

Type II - The null should be rejected, because there is a fire. However, since the alarm did not ring, we think there is no fire. We did not reject the null hypothesis, when the null hypothesis is false.

Consequence - People are injured in the fire. Building is destroyed.

Scenario 6: An x-ray machine at airport security says "metal object found", but there is no metal object in your bag.

Null: Your bag does not contain a metal object.

Alternative: Your bag contains a metal object.

Type I - The null hypothesis was true, but the machine said the alternative was true. We rejected the null hypothesis, when the null hypothesis was true.

Consequence - Waiting for additional screening of the bag.