Probability - lab report example

Science, Biology

Probability

Probability Probability defines an event’s chance of occurrence and may be theoretical or experimental. While theoretical probability relies on naturally expected observations, experimental probability is derived from experimental observations. This report seeks to investigate probabilities in genetics and inheritance. The paper concludes that theoretical probability sufficiently predicts inheritance of genes.

Introduction

Olofsson explains that the knowledge of probability is fundamental in understanding inheritance of genes (p. 56). This is because characteristics of parents that are passed over to their offspring follow specific patterns. Both parents have pairs of chromosomes out of which one is transferred to an offspring at random. An offspring therefore, independently, and randomly, derives one of each pair of chromosomes from each of the parents. Probability therefore helps to understand chances and possibilities of genetic compositions of offspring based on their parents’ genetic compositions (Olofsson, p. 56).

This paper seeks to investigate probabilities of outcomes of events in tossing two sided coins. The paper will explore and compare the experimental and theoretical probabilities from tossing the coins for conclusions over inheritance of genes.

Methods

The experiment was conducted by repeatedly flipping a coin. With twenty events, observations were made for head, tail, and frequencies recorded. The experiment was repeated with two simultaneous tosses and pairs of

observations recorded.

Results

The results of the first set of experiment are summarized in the table bellow

Student’s results for single experiment

Heads

Tails

Total

Number

Observed frequency

5/20

15/20

20/20

Expected frequency

1/2

1/2

1

Results for paired ‘ two-coin flips’

Coin A

Coin B

Observed number

Observed frequency

Expected frequency

Head

Head

3

3/20

¼

Head

Tail

7

7/20

¼

Tail

Head

4

4/20

¼

Tail

Tail

6

6/20

¼

Total

20

20/20

1

The combined observations for the class experiments are also shown below:

Class results for single flips

Heads

Tails

Total

Number

Observed frequency

39/80

41/80

80/80

Expected frequency

40/80

40/80

1

Class results for ‘ two-coined flips’

Coin A

Coin B

Observed number

Observed frequency

Expected frequency

Head

Head

21

21/80

¼

Head

Tail

23

23/80

¼

Tail

Head

17

17/80

¼

Tail

Tail

19

19/80

¼

Total

80

80/80

1

If the head-tail observations in the double flips were made without regard to the order, then the table of results would be as follows

Student’s results

Coin A

Coin B

Observed number

Observed frequency

Expected frequency

Head

Head

3

3/20

¼

Head

Tail

11

11/20

½

Tail

Tail

6

6/20

¼

Total

20

20/20

1

Class results

Coin A

Coin B

Observed number

Observed frequency

Expected frequency

Head

Head

21

21/80

¼

Head

Tail

40

40/80

½

Tail

Tail

19

19/80

¼

Total

80

80/80

1

Discussion

Results, as reported from individual observations, differ from expected frequencies though they are evenly distributed across expected frequencies. The combined class observations however converge towards the expected frequencies. This means that the genetic probabilities that can be derived from outcomes of the coins converge to theoretical probabilities when a large number of events are considered. Probability therefore significantly explains inheritance of genes.

Conclusion

The results of the experiment indicate that probability distributions can be used to predict and explain inheritance of genes.

Works cited

Olofsson, Peter. Probability, Statistics, and Stochastic Processes. New Jersey, NJ: John Wiley & Sons, 2011. Print