

Independent and Dependent Events

A Simple Example with Independent Events

Prof Hans Georg Schaathun

Høgskolen i Ålesund

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The Coin Toss

- 1 We shall toss two coins



- 1 What is the probability of getting head twice?

Probability Distribution

Coin 1



Coin 2



Probability Distribution

Coin 1



Coin 2

Probability Distribution

Coin 1

Coin 2



Throwing two Coins

Coin 1



Coin 2



Probability Theory

- Four events: ($i = 1, 2$)
 - H_i : Coin i is Head
 - T_i : Coin i is Tail
- Consider the probability distribution of Coin 2
 - 1 $P(H_2) = 0.5$
 - 2 $P(H_2|H_1) = 0.5$
 - 3 $P(H_2|T_1) = 0.5$

The question was *what is the probability of getting head on both coins?*

- Two heads means $H_1 \cap H_2$
- The events H_1 and H_2 are independent.
 - Therefore $P(H_1 \cap H_2) = P(H_1) \cdot P(H_2) = 0.25$

Summary

- **Conditional Probability**
 - $P(A|B)$ - the probability of A , assuming that B occurred
- **Independent events**
 - if $P(A|B) = P(A|\neg B)$, then A and B are independent events
- When A and B are independent
 - The joint probability $P(A \cap B) = P(A) \cdot P(B)$