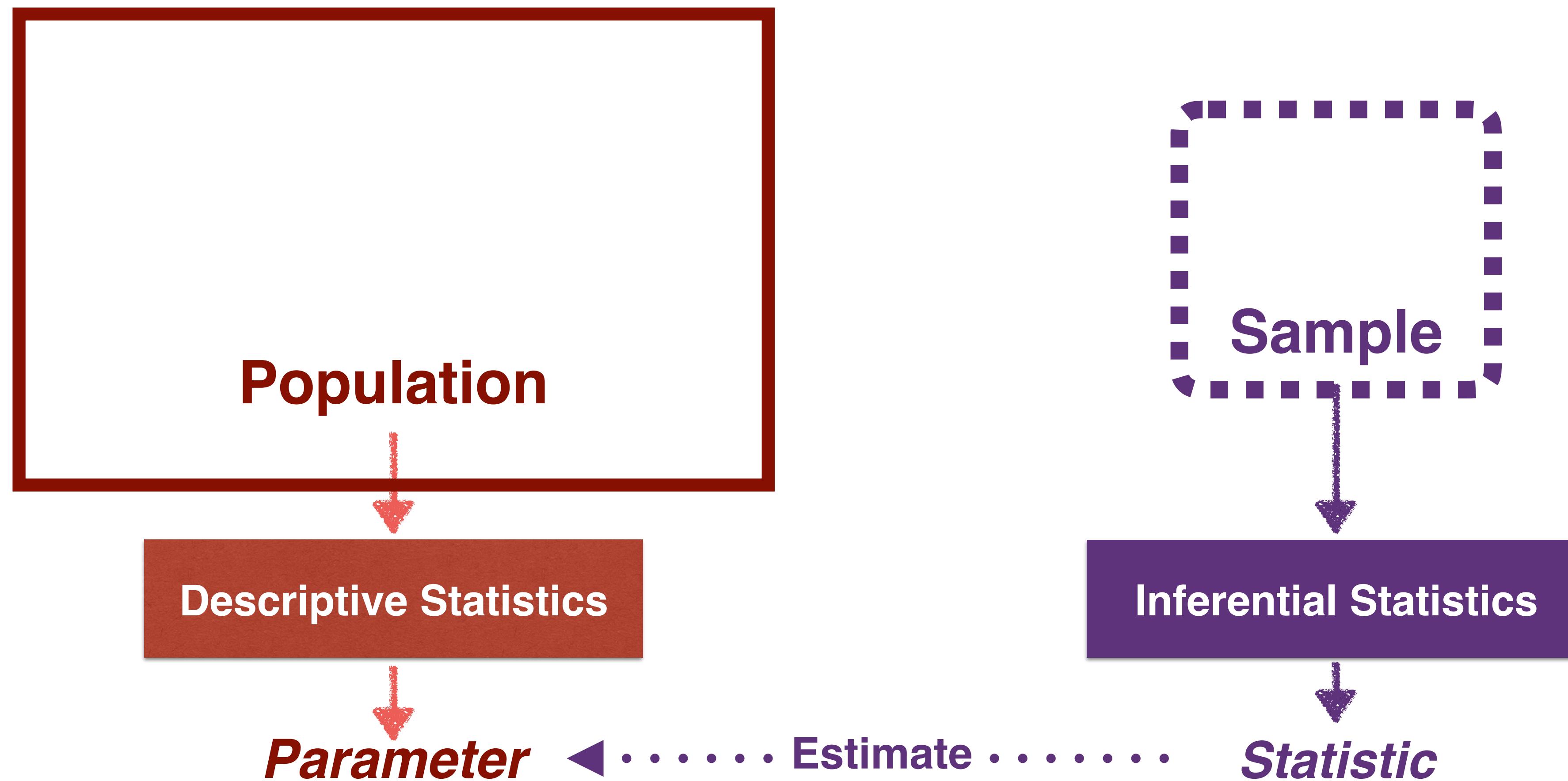


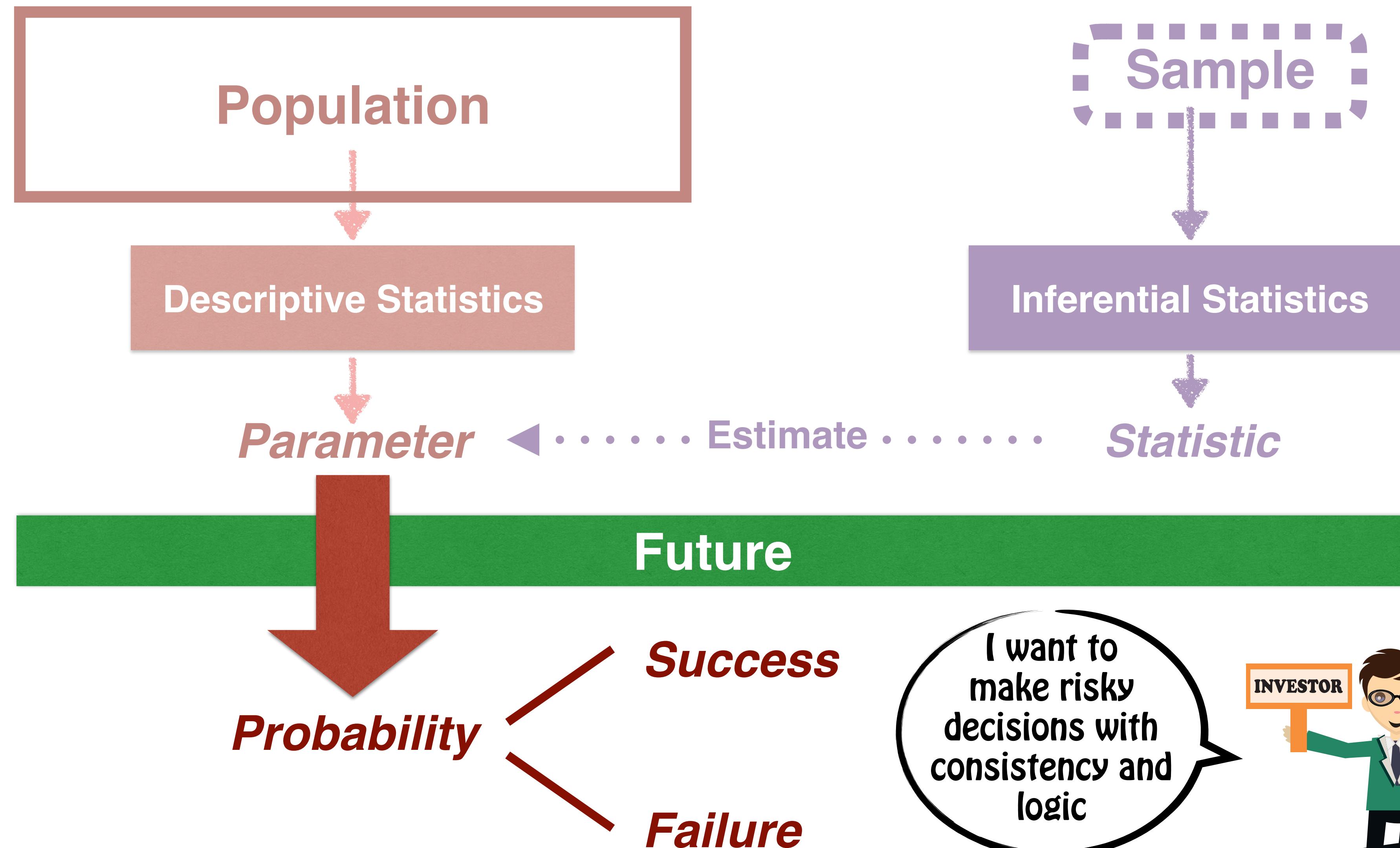
Probability Concepts

Definitions in Probability Concepts

Past



Past



Definitions in Probability Concepts

I want to make risky decisions with consistency and logic



Definitions (Probability)

Random variable

uncertain quantity or number

-5%	0%	+4%	+7%	+11%
-8%	+1%	+3%	+6%	+8%

X: *monthly return of asset A*



Definitions (Probability)

Outcome

observed value of a

Random variable

uncertain quantity or number

-5%	0%	+4%	+7%	+11%
-8%	+1%	+3%	+6%	+8%

X: *monthly return of asset A*



Definitions (Probability)

Event

a single Outcome



observed value of a

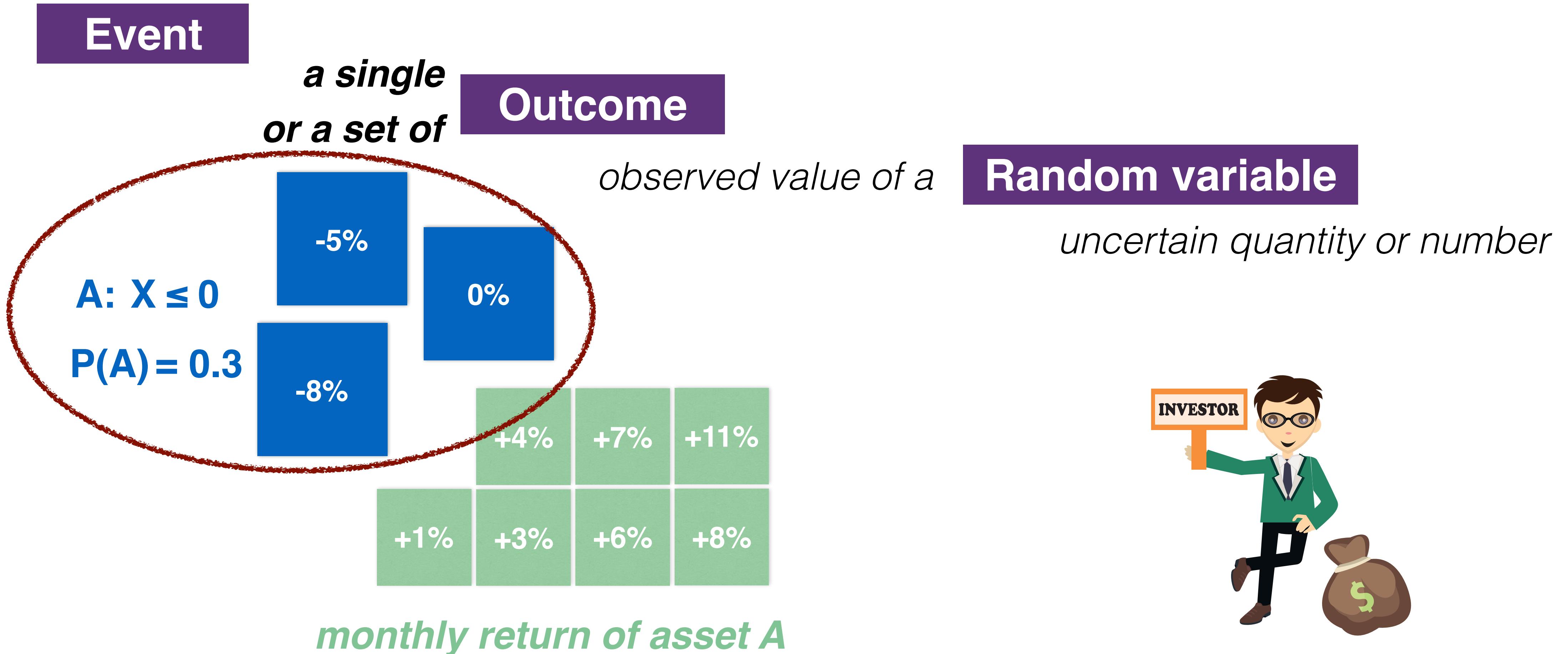
Random variable

uncertain quantity or number



X: *monthly return of asset A*

Definitions (Probability)

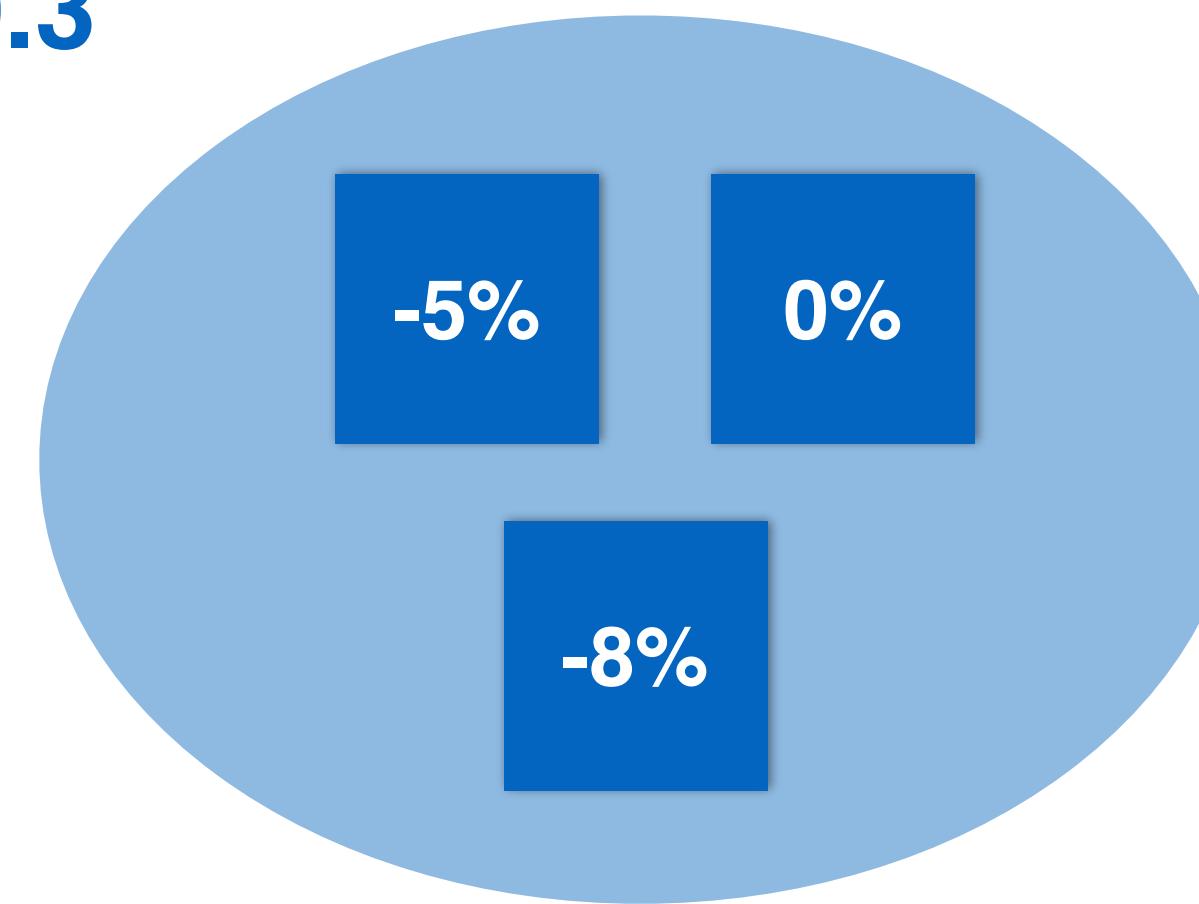


Mutually Exclusive Events

cannot happen at the same time

A: $X \leq 0$

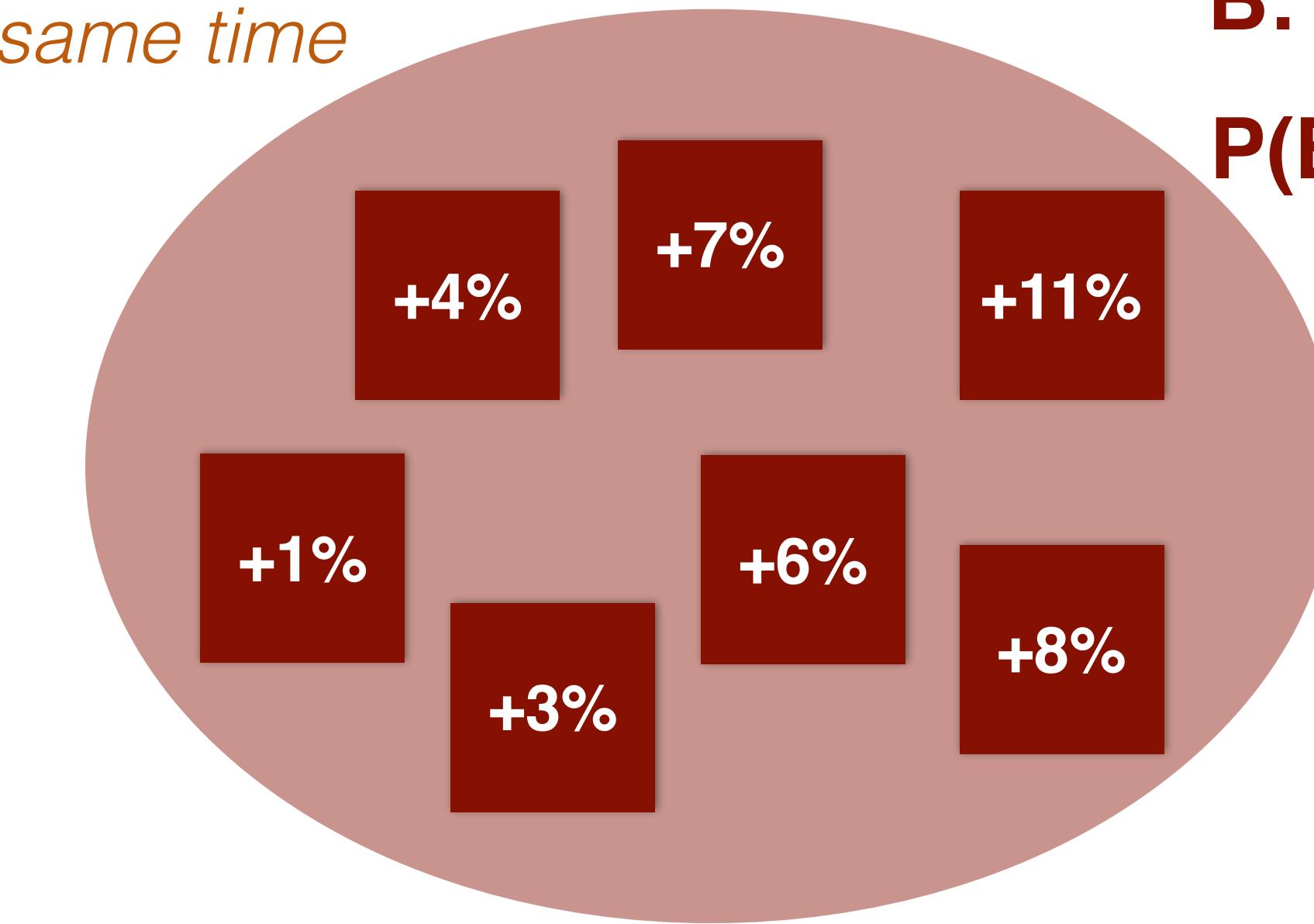
P(A) = 0.3



*monthly returns cannot be positive
and negative at the same time*

B: $X > 0$

P(B) = 0.7

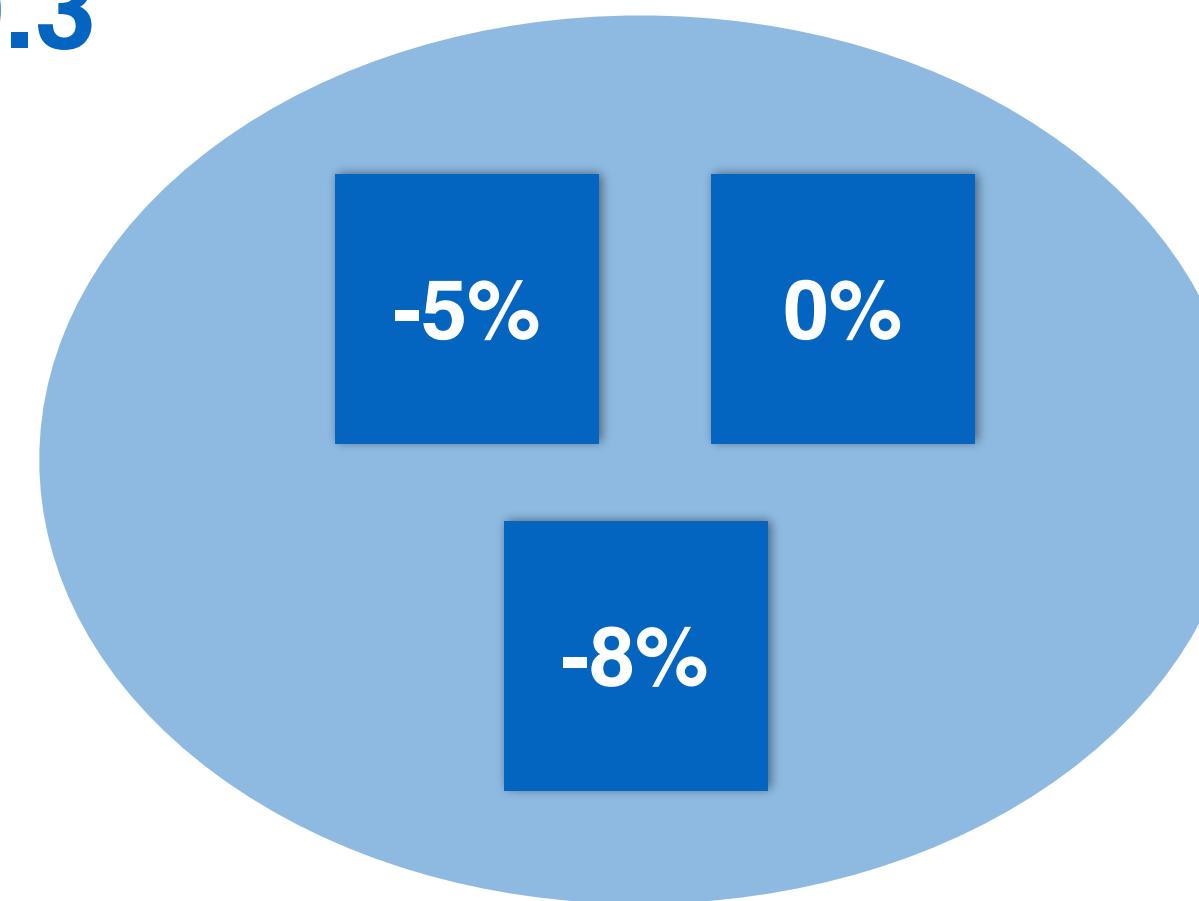


Exhaustive Events

include all possible outcomes

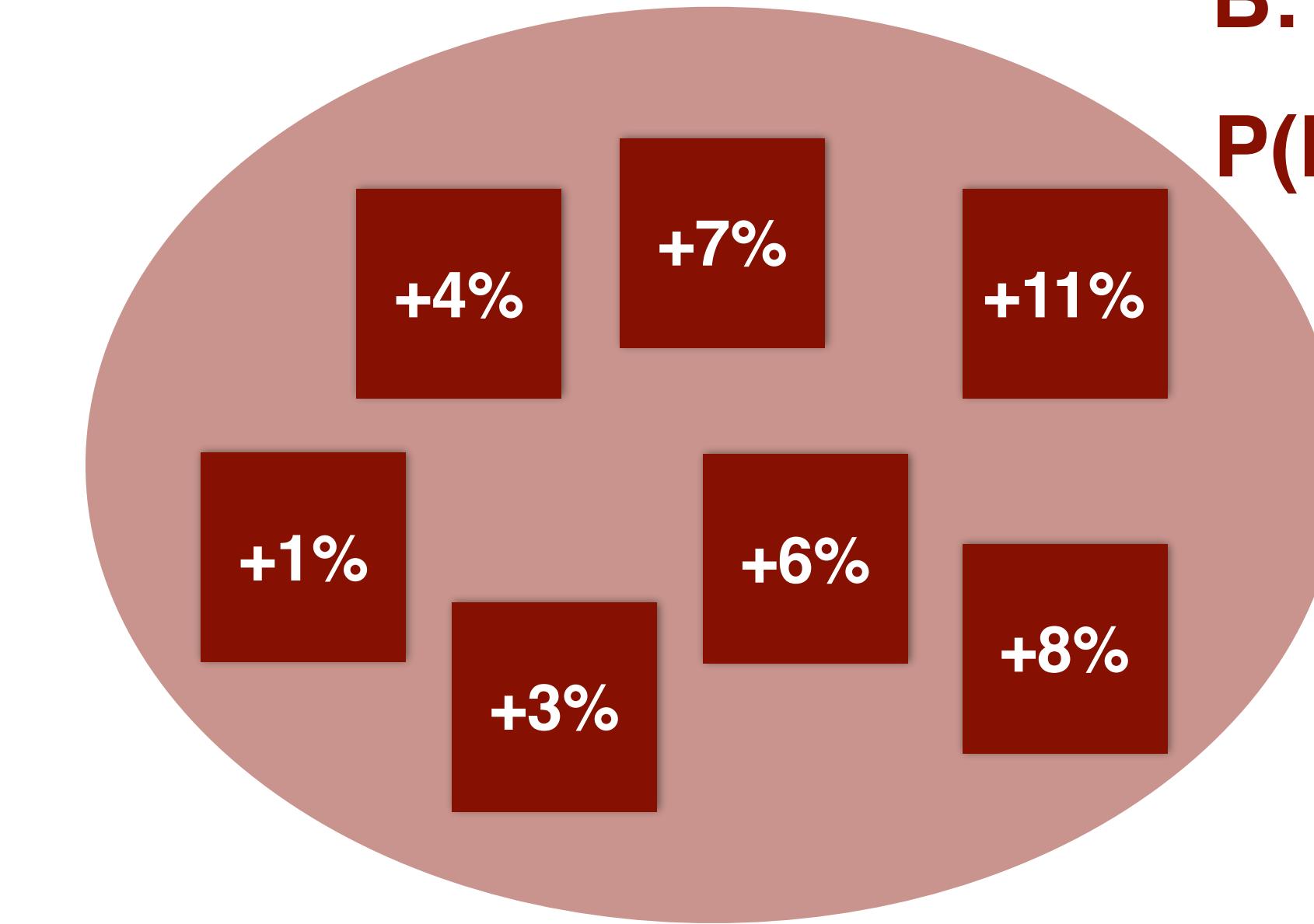
A: $X \leq 0$

P(A) = 0.3



B: $X > 0$

P(B) = 0.7



Definitions in Probability Concepts

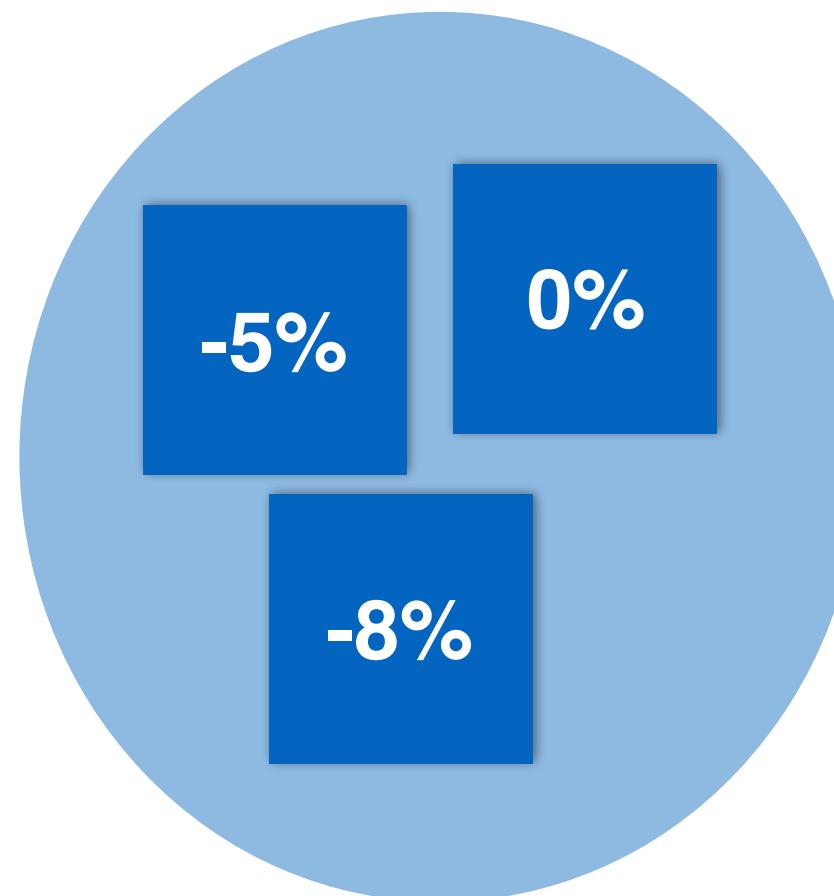
Exhaustive Events

include all possible outcomes

Mutually Exclusive

A: $X \leq 0$

$P(A) = 0.3$



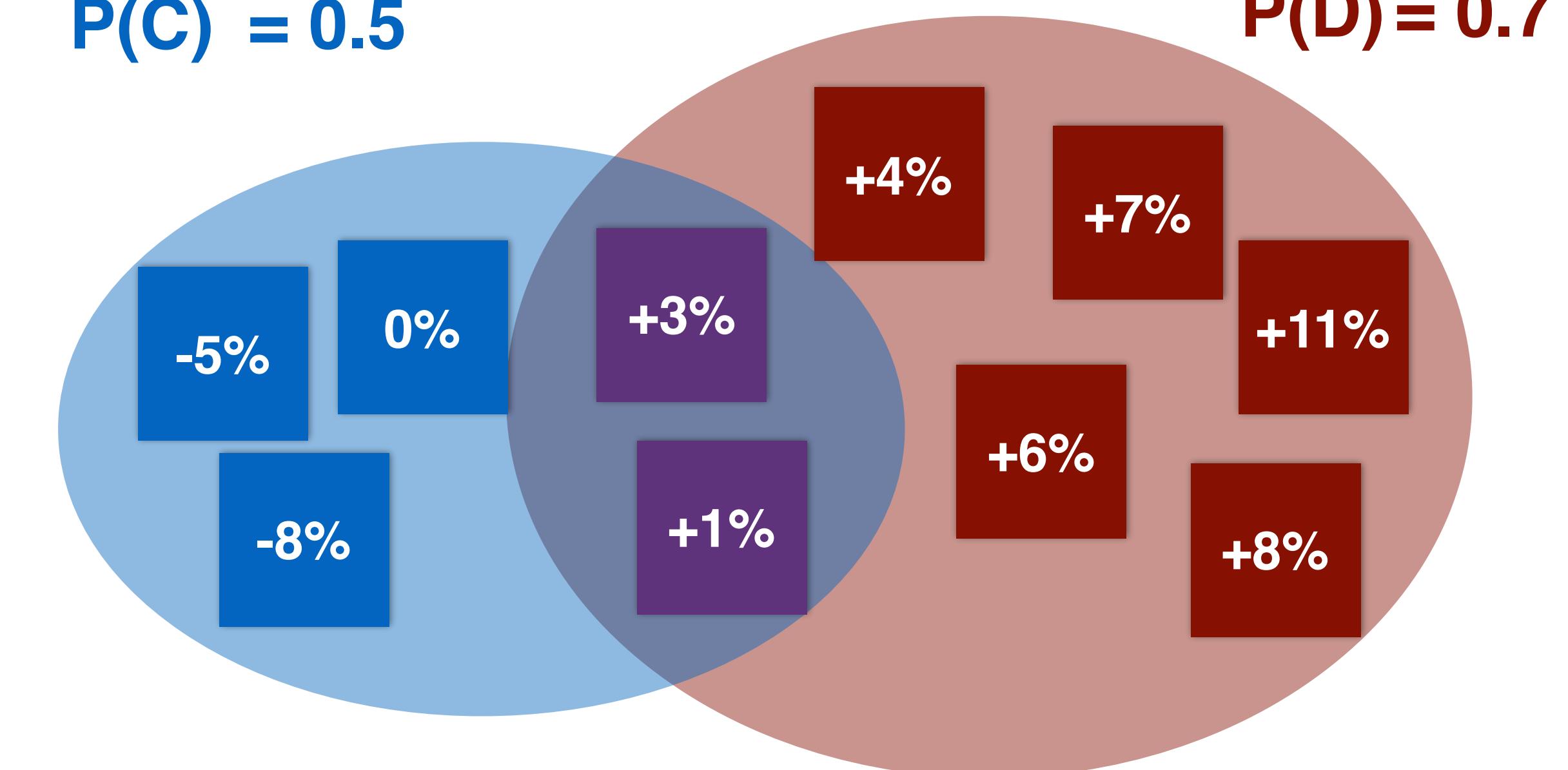
B: $X > 0$

$P(B) = 0.7$

Non Mutually Exclusive

C: $X \leq 3$

$P(C) = 0.5$



D: $X > 0$

$P(D) = 0.7$

Both exhaustive and mutually exclusive

$$P(A) + P(B) = 1$$

$$P(C) + P(D) = 1.2 \neq 1$$

Definitions in Probability Concepts

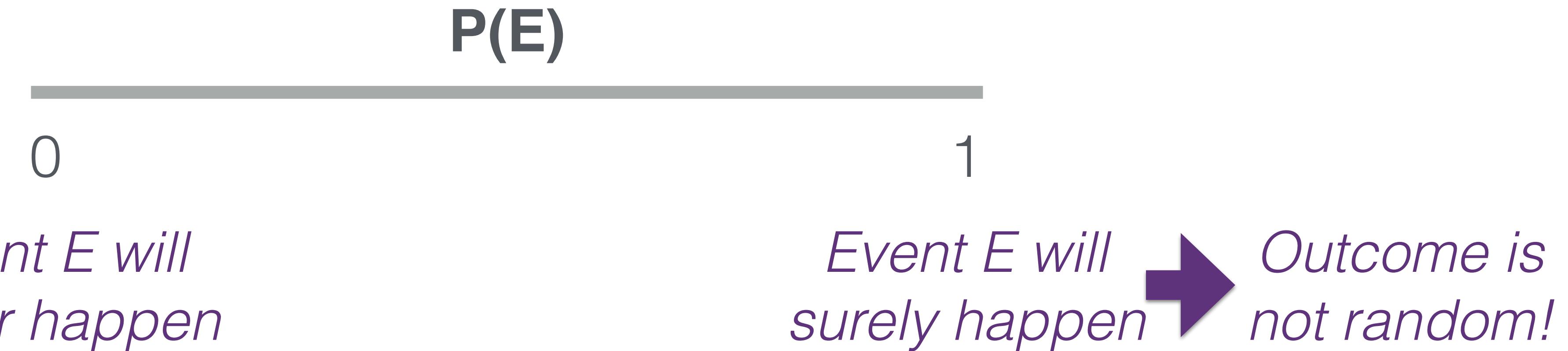
Defining Properties of Probability

1

*If a set of events are **Mutually Exclusive** and **Exhaustive**
the sum of their probabilities is **equal to 1***

2

*The probability of any event is between **0 and 1***



So how do we determine probability?

Empirical

Analyse past data

The mean of past monthly returns for the past 2 years is 4.5%

A Priori

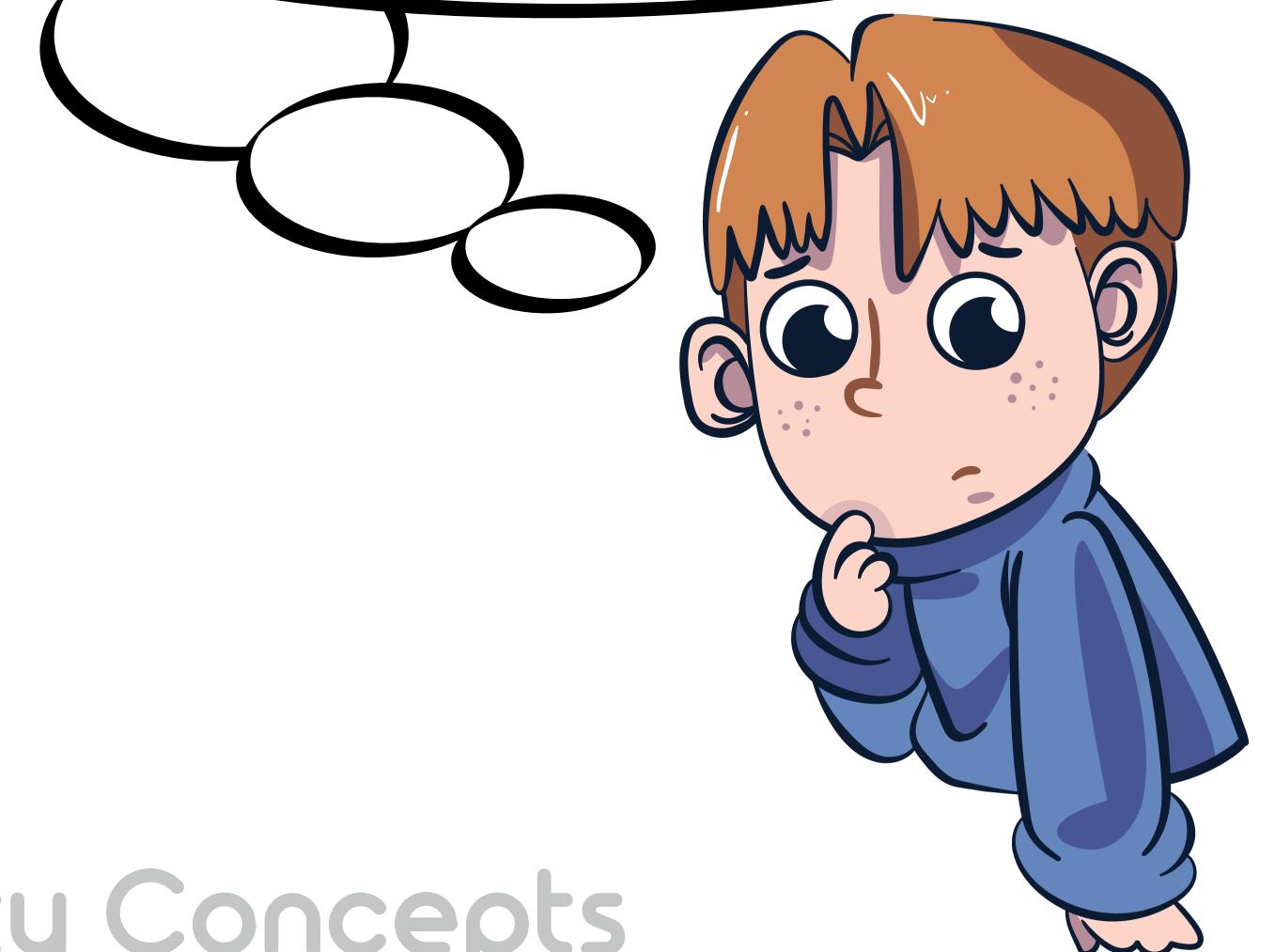
Formal reasoning

The company has a pipeline of products that will open up new revenue streams

Subjective

Personal judgement

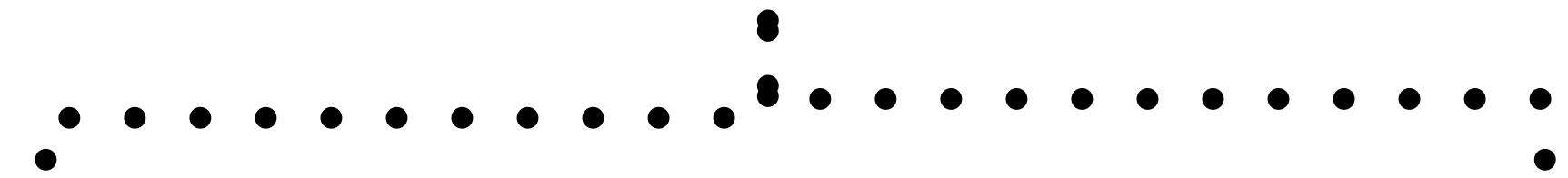
I think the management is a strong team..



Definitions in Probability Concepts

So how do we determine probability?

Objective



Empirical

Analyse past data

The mean of past monthly returns for the past 2 years is 4.5%

A Priori

Formal reasoning

The company has a pipeline of products that will open up new revenue streams

Subjective

Personal judgement

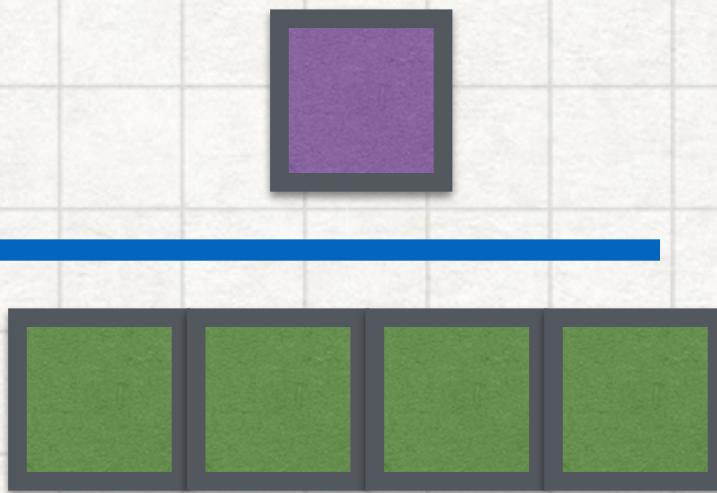
I think the management is a strong team..

Probability can be stated as odds

$$P(E) = 0.2$$

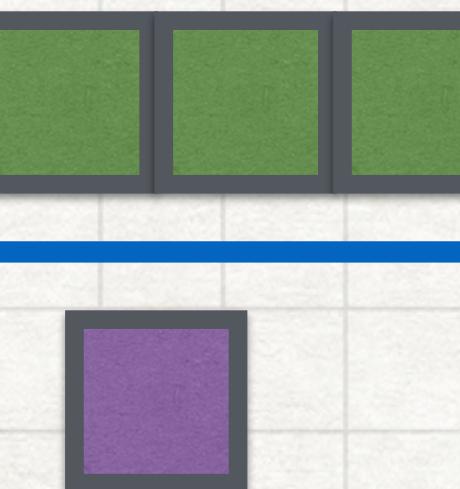


$$\text{Odds FOR} = \frac{P(E)}{1-P(E)} = \frac{1}{4}$$



1 occurrence of E
for every
4 non-occurrence

$$\text{Odds AGAINST} = \frac{1-P(E)}{P(E)} = \frac{4}{1}$$



\$4 profit
for every
\$1 wagered

Receive
back \$5



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