

Agents Behaviour

Part iii

Bias and learning



Couldn't find a decent meme about learning, here's a puppy instead

Learning outcomes

Learn findings from **behavioural economics**

See **cognitive bias** examples

Compare different **learning mechanisms**



“Thinking, fast and slow”

Cognitive psychology says we have two ways of thinking:

Reasoning: slow, voluntary, controlled, effortful, serial

Intuition: fast, spontaneous, associative, effortless



What is this?



What's the most common pet after dogs?

“Irrational” individual behaviour

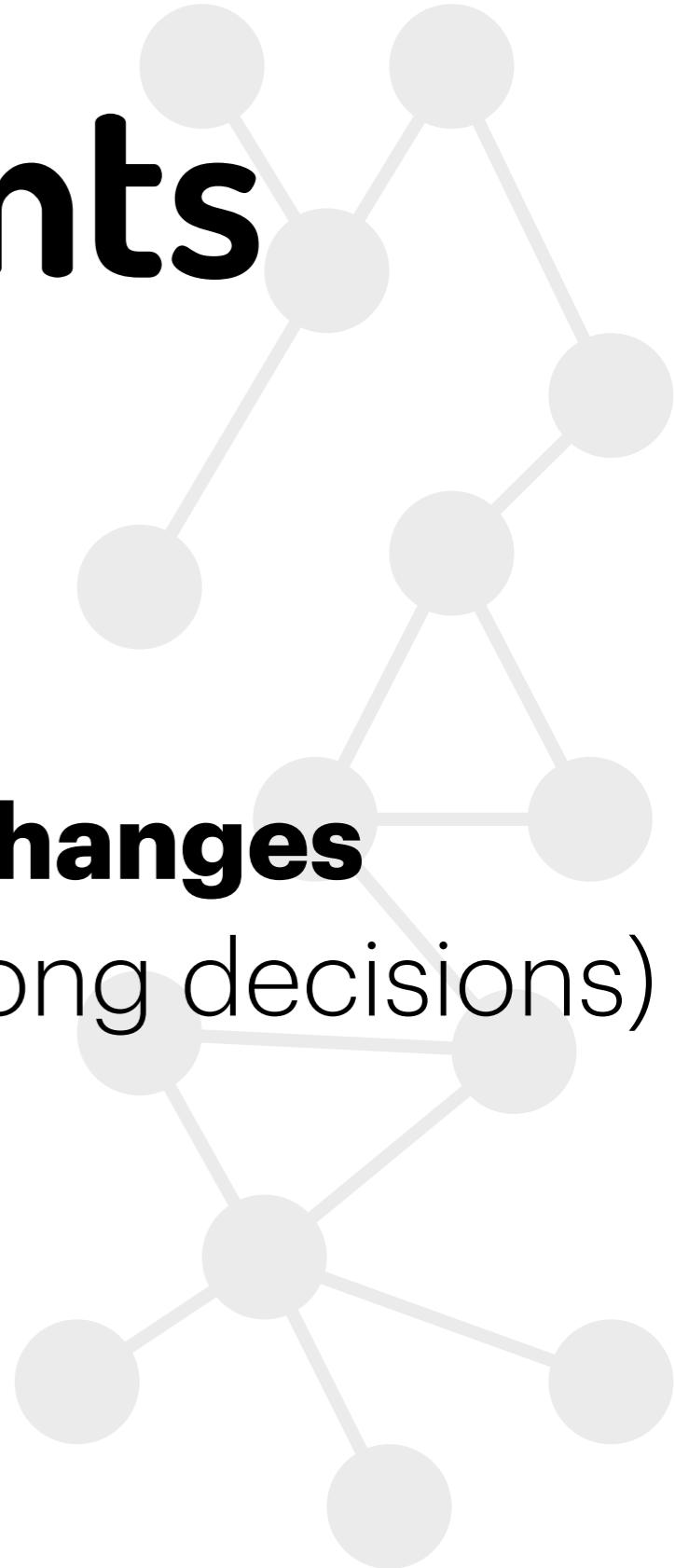
Framing effect and risk preferences



Reference points

We are more susceptible to changes

(And because of this we make the wrong decisions)





Small

\$3



Large

\$7



Small

\$3



Medium

\$6.5



Large

\$7

HGTV

PROPERTY BROTHERS



SEASON 7

Examples



£200k

Examples



£200k

£600k

Examples



£200k

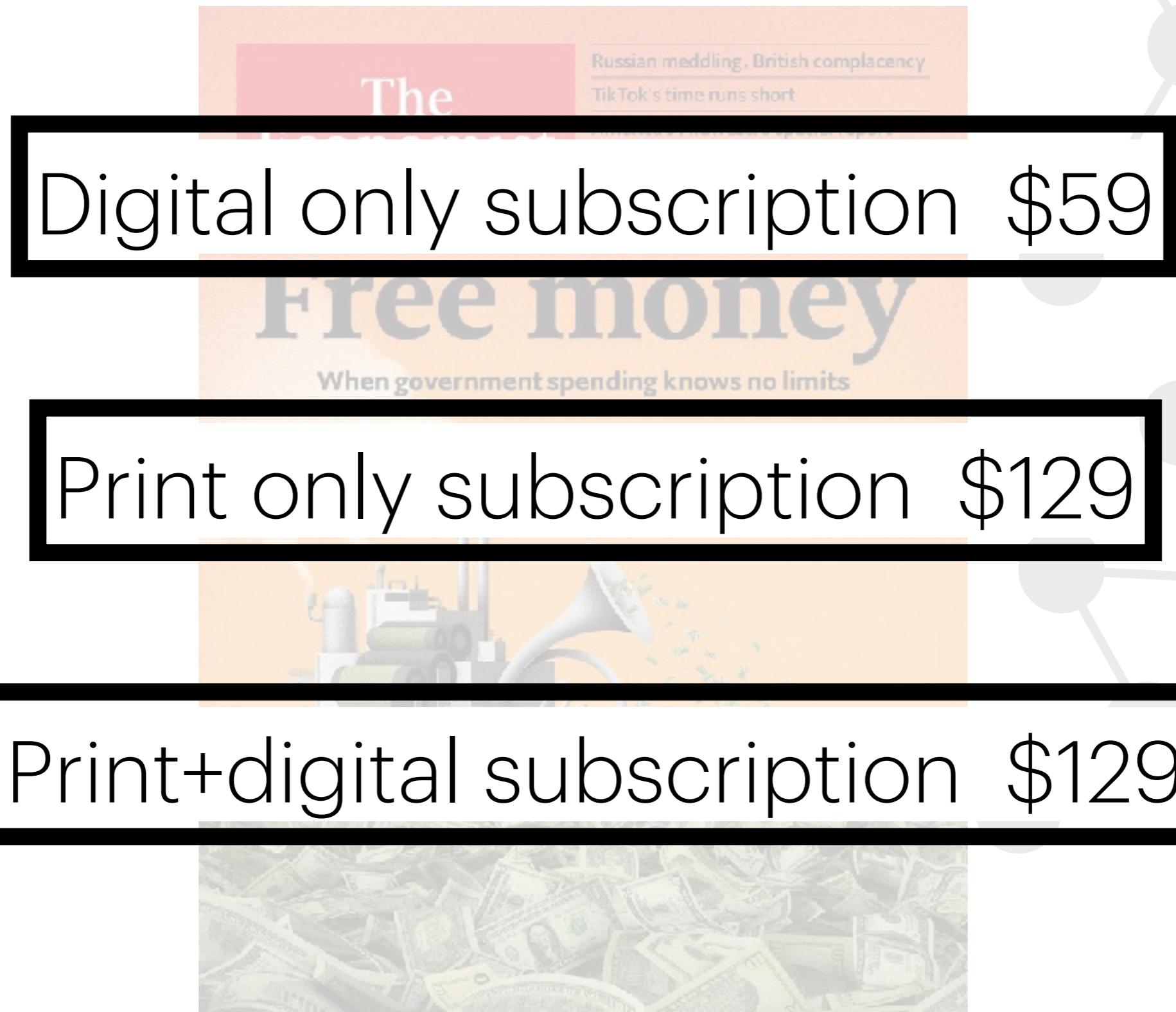
£300k

£600k

The economist experiment



The economist experiment



The economist experiment

Pricing of the famous magazine “the economist” is changed frequently

Some prices are unreasonable

Prof. Dan Ariely used this setting for an experiment with his students

The economist experiment

Digital only subscription \$59

Print+digital subscription \$129

The engagement



68% chose
digital only
32% chose
print+digital

59

Print+digital subscription \$129

The engagement



68% chose
digital only

59

32% chose
print+digital



Total revenue =

129

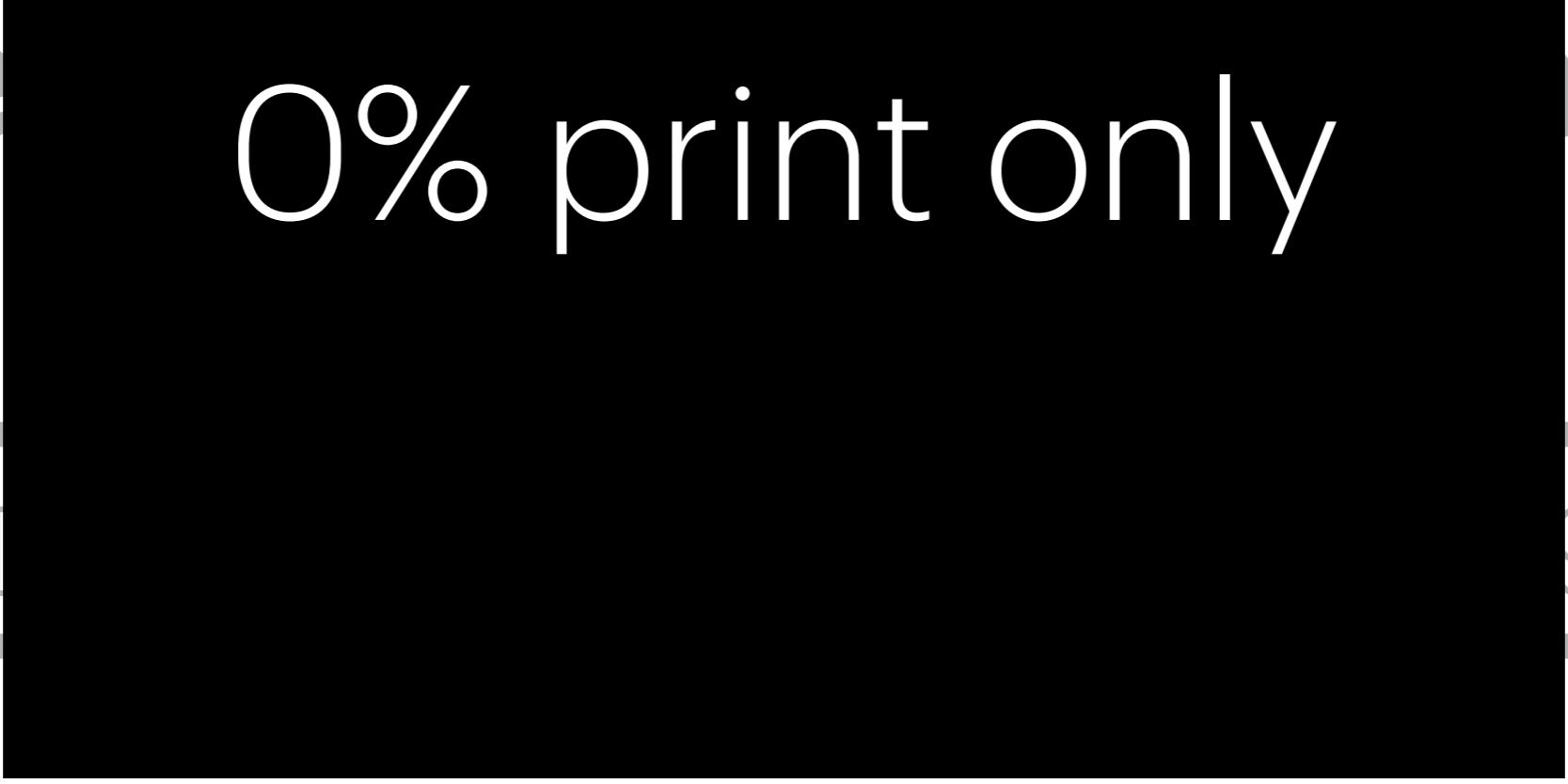
\$8,012

The economist experiment

Digital only subscription \$59

Print only subscription \$129

Print+digital subscription \$129

The  cent

0% print only

Print only subscription \$129

Print+digital subscription \$129

The present

0% print only
16% digital only
84% print+digital

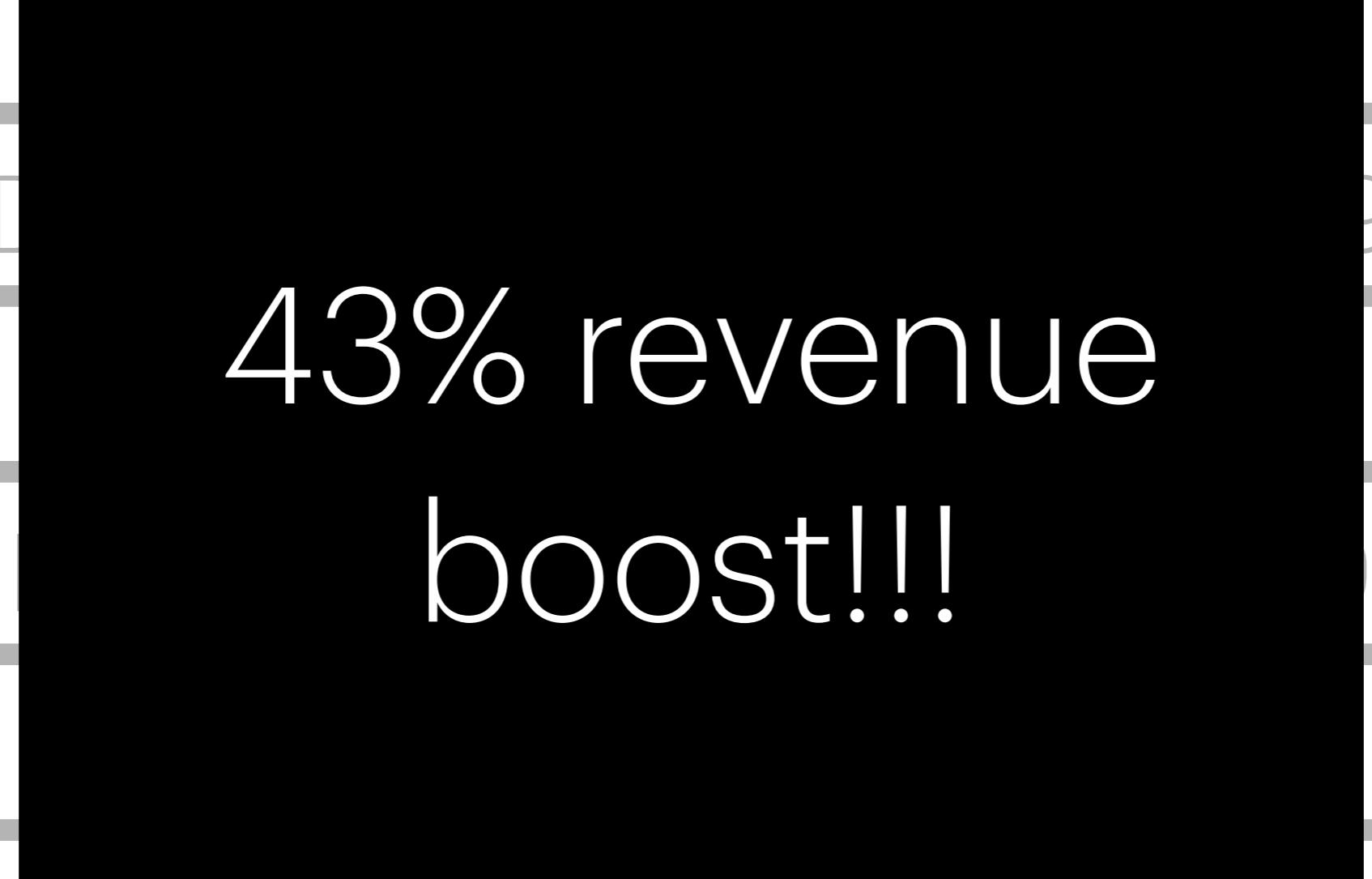
P

Total revenue =

\$11,444

Print+digital Subscription 129

The economist experiment



43% revenue
boost!!!

Print+digital subscription \$129

The concept

If I prefer
a over b,
and
b over c,
I will prefer
a over c

D

R

Pr

9

9

29

Beware... the decoy effect

consumers will tend to have a **specific change in preference** between two options when also presented with a third option that is **asymmetrically dominated**.

Examples

Candidate A



Candidate B



Candidate C



Voters' Perceptions

Strong on national security

+++

+++

++

Fresh face in Washington

+++

+

+

Chances of winning the election

+++

+++

+

Examples

Candidate A



Candidate B



Candidate C



Voters' Perceptions

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Examples

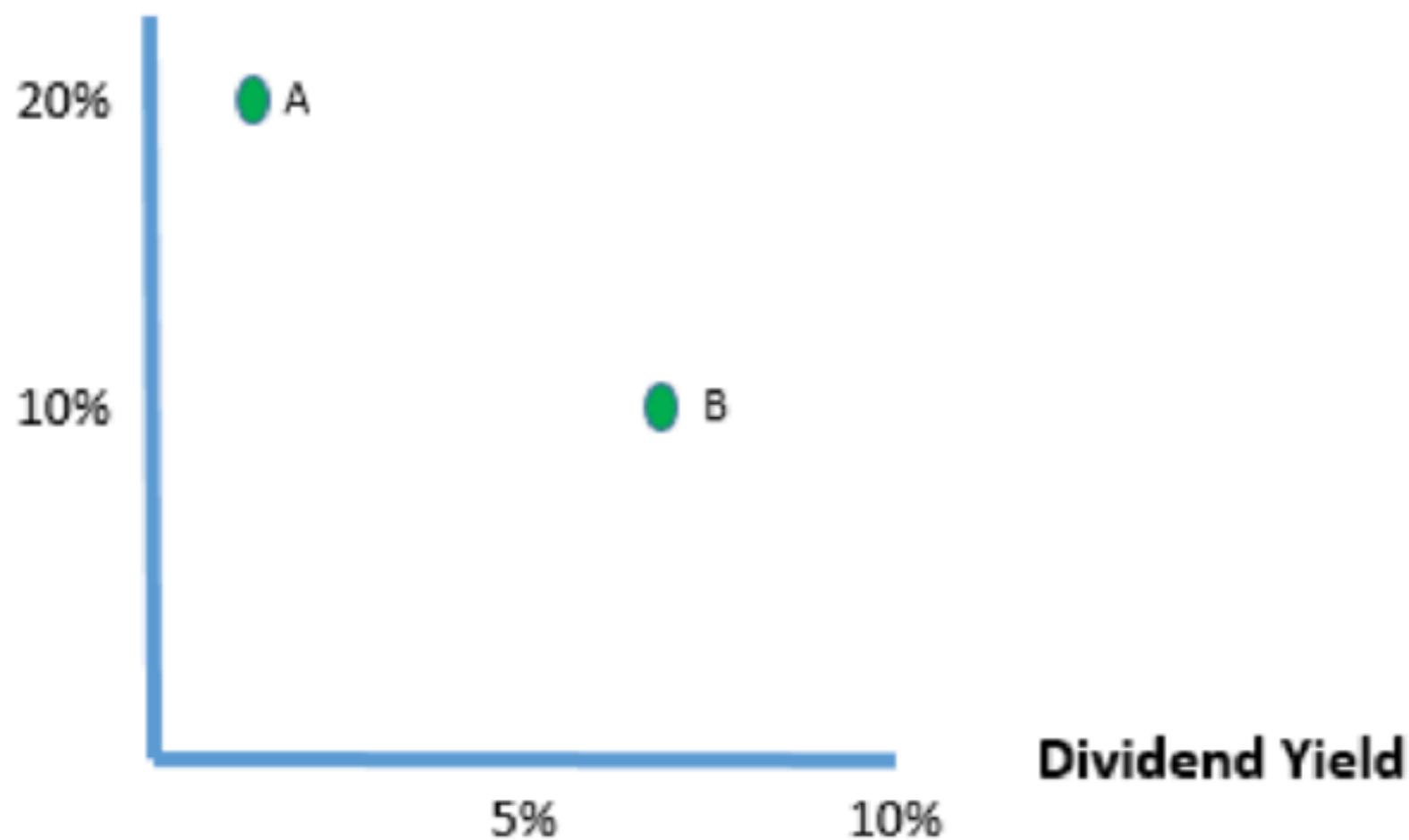
Stock A: long-term growth 20% - dividend yield 2%

Stock B: long-term growth 10% - dividend yield 7%

Examples

Situation 1

Long Term Growth



Examples

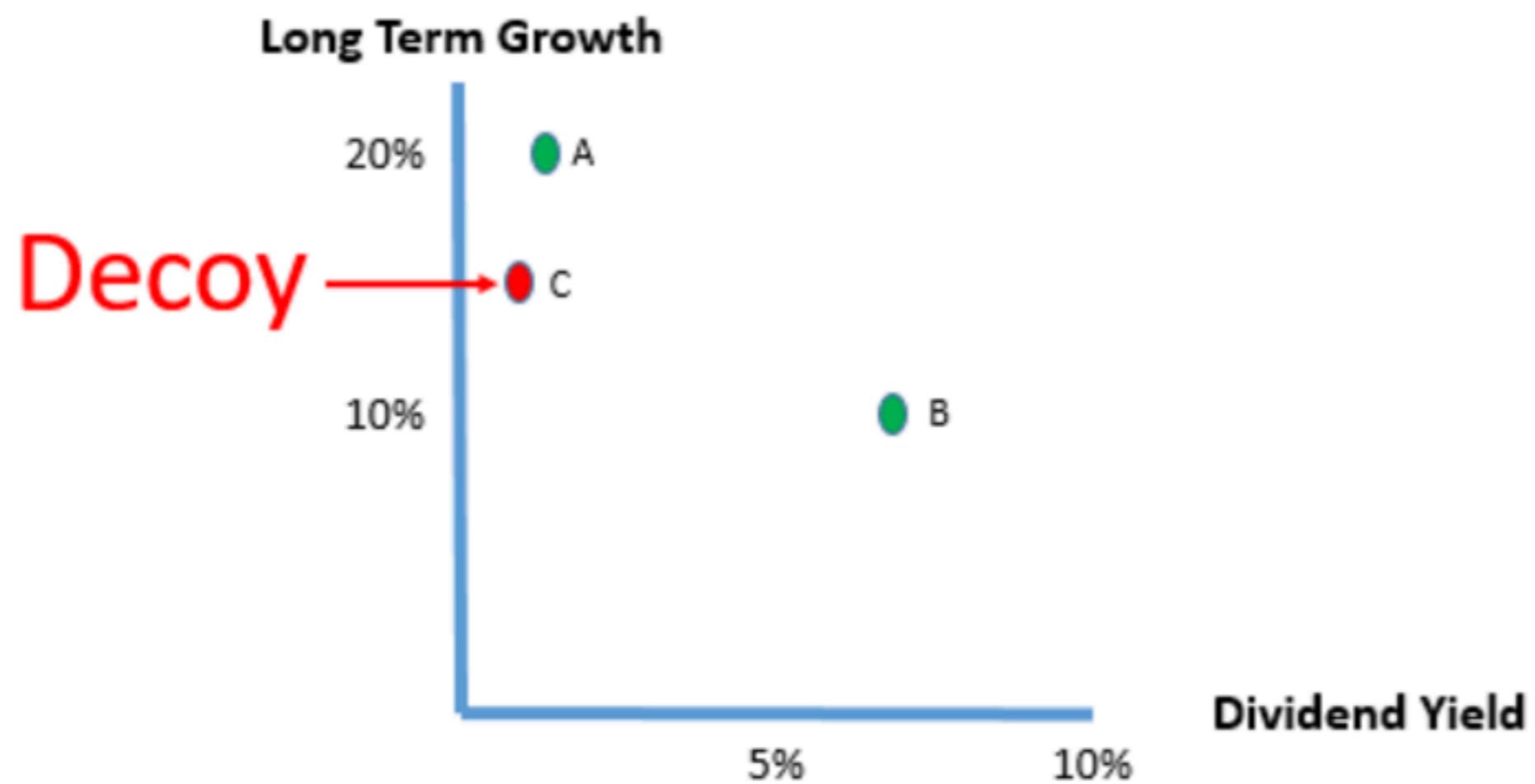
Stock A: long-term growth 20% - dividend yield 2%

Stock B: long-term growth 10% - dividend yield 7%

Stock C: long-term growth 15% - dividend yield 1%

Examples

Situation 2



Examples

Stock A: long-term growth 20% - dividend yield 2%

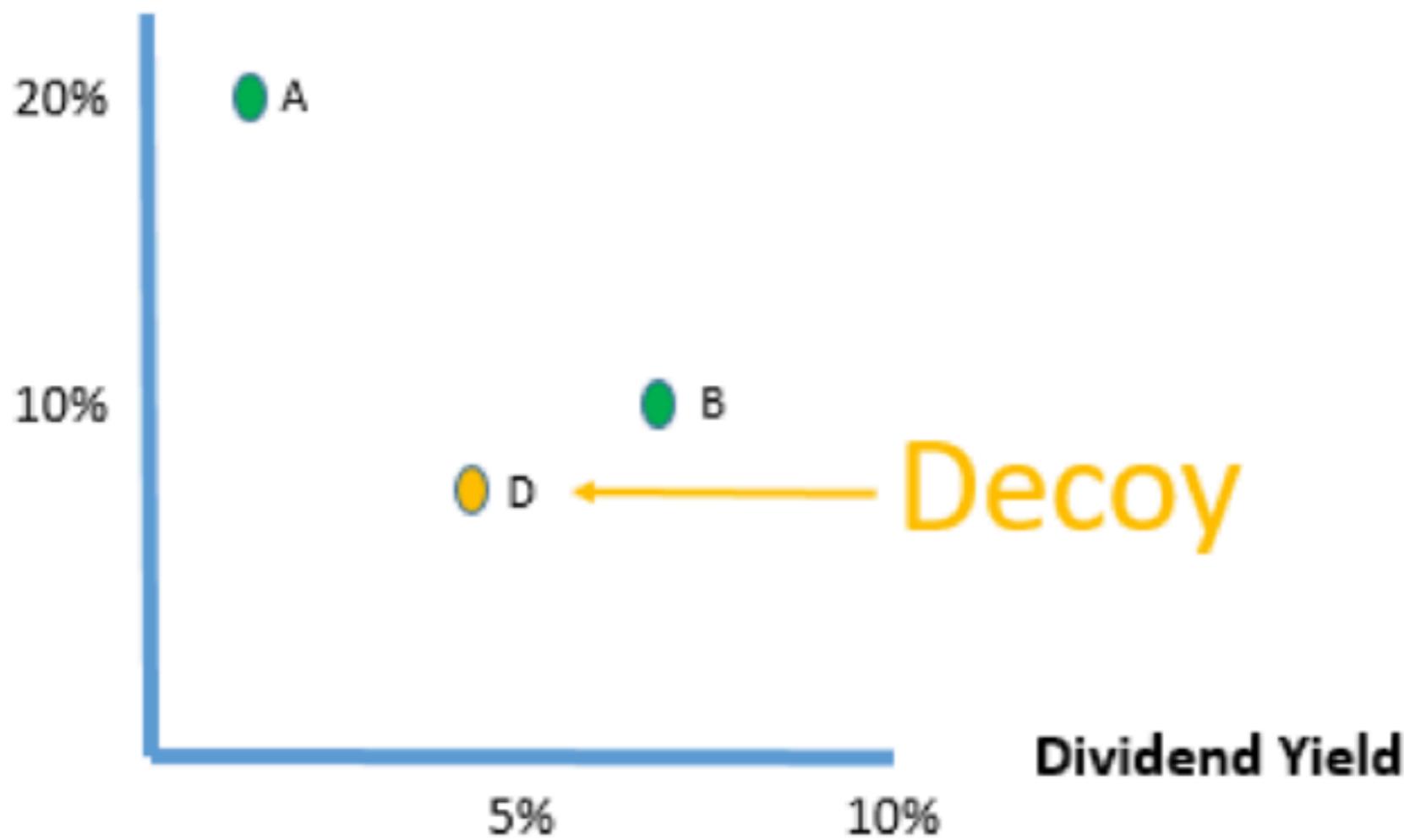
Stock B: long-term growth 10% - dividend yield 7%

Stock D: long-term growth 7% - dividend yield 4.5%

Examples

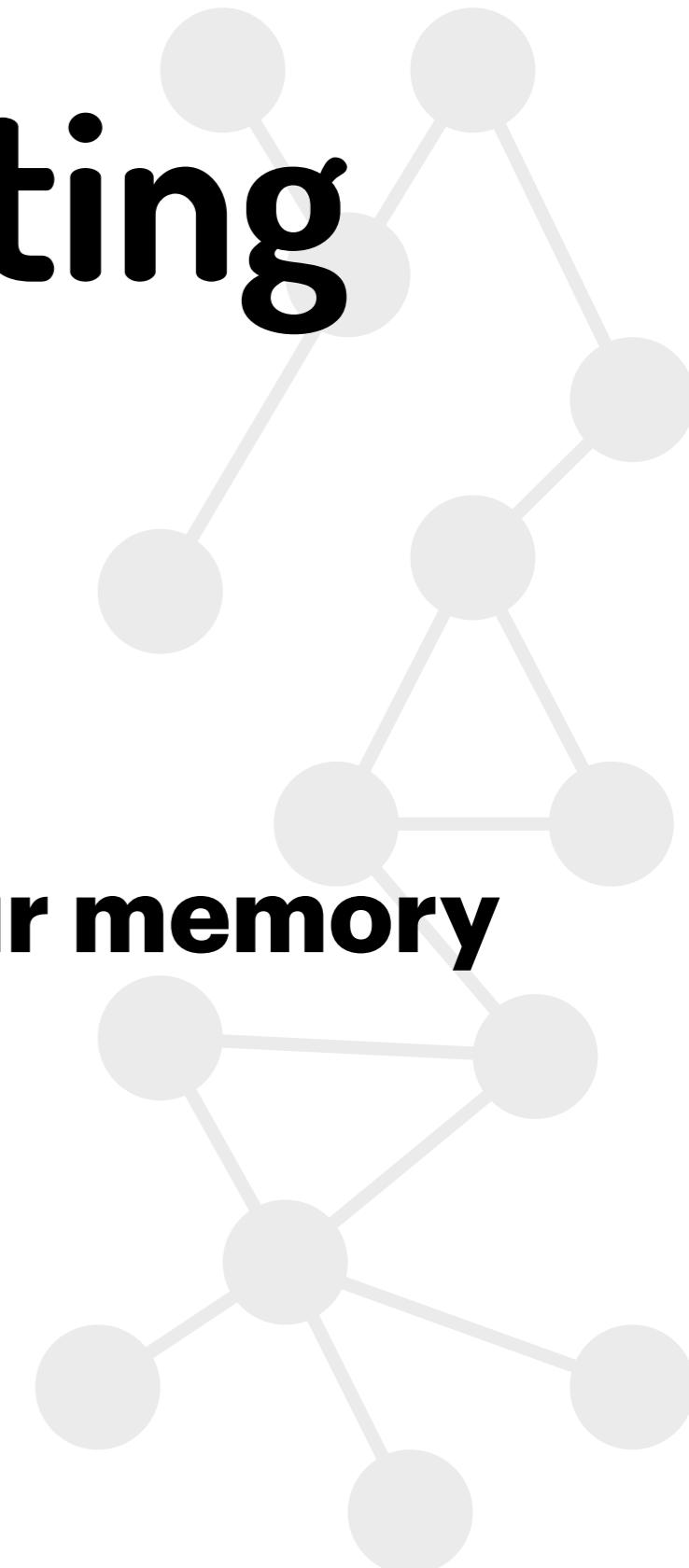
Situation 3

Long Term Growth



Mental accounting

We keep “compartments” in our memory



Mental accounting

Imagine that you have decided to see a show where admission is **\$10 per ticket**. As you enter the theatre you discover that you have **lost a \$10 bill**. Would you still **pay \$10 for a ticket** for the show?

Imagine that you have decided to see a show and **paid** the admission price of **\$10 per ticket**. As you enter the theatre you discover that you have **lost the ticket**. Would you pay \$10 for **another** ticket?

Mental accounting

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Mental accounting

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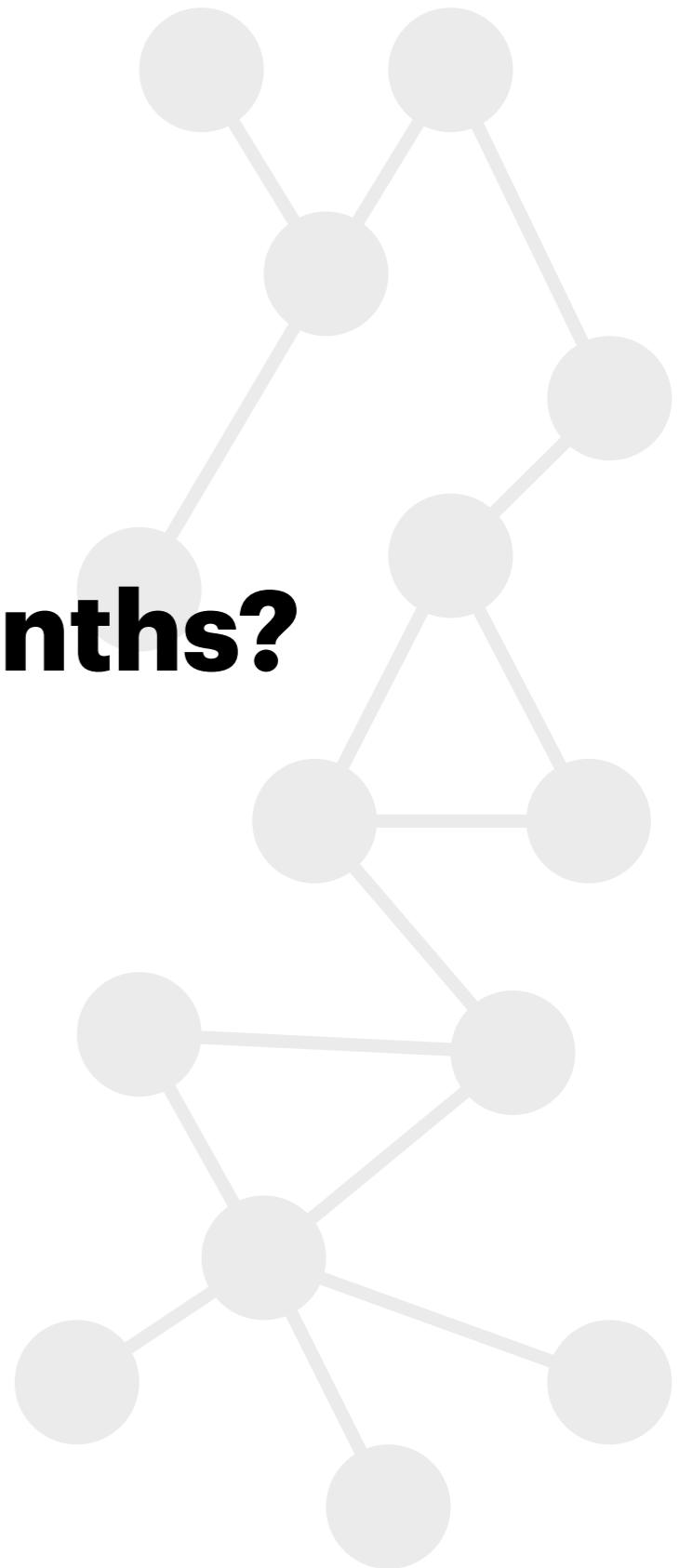
Yes: 88%

Imagine that you have decided to see a show and **paid** the admission price of **\$10 per ticket**. You enter the theatre and discover that you **lost your ticket**. Would you pay **\$10 for another ticket**?

Yes: 46%

Example

£50 now or £100 in six months?



Example

£50 now or £100 in six months?

£50 in 6 months or £100 in a year?



Hyperbolic discounting

We are **not good at judging time**

We want everything **now**

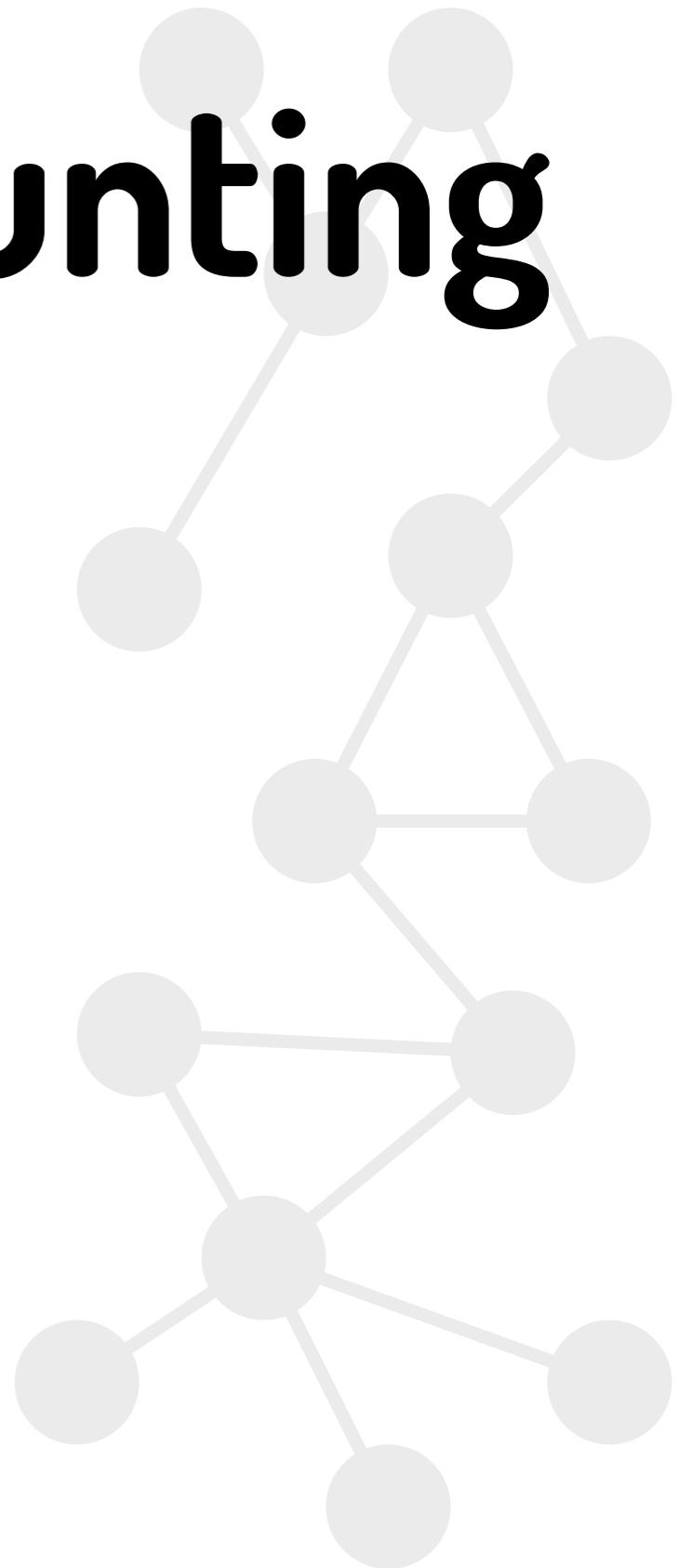
Instant gratification



Hyperbolic discounting

**Classical
economics**

$$\frac{1}{1+k}^t$$

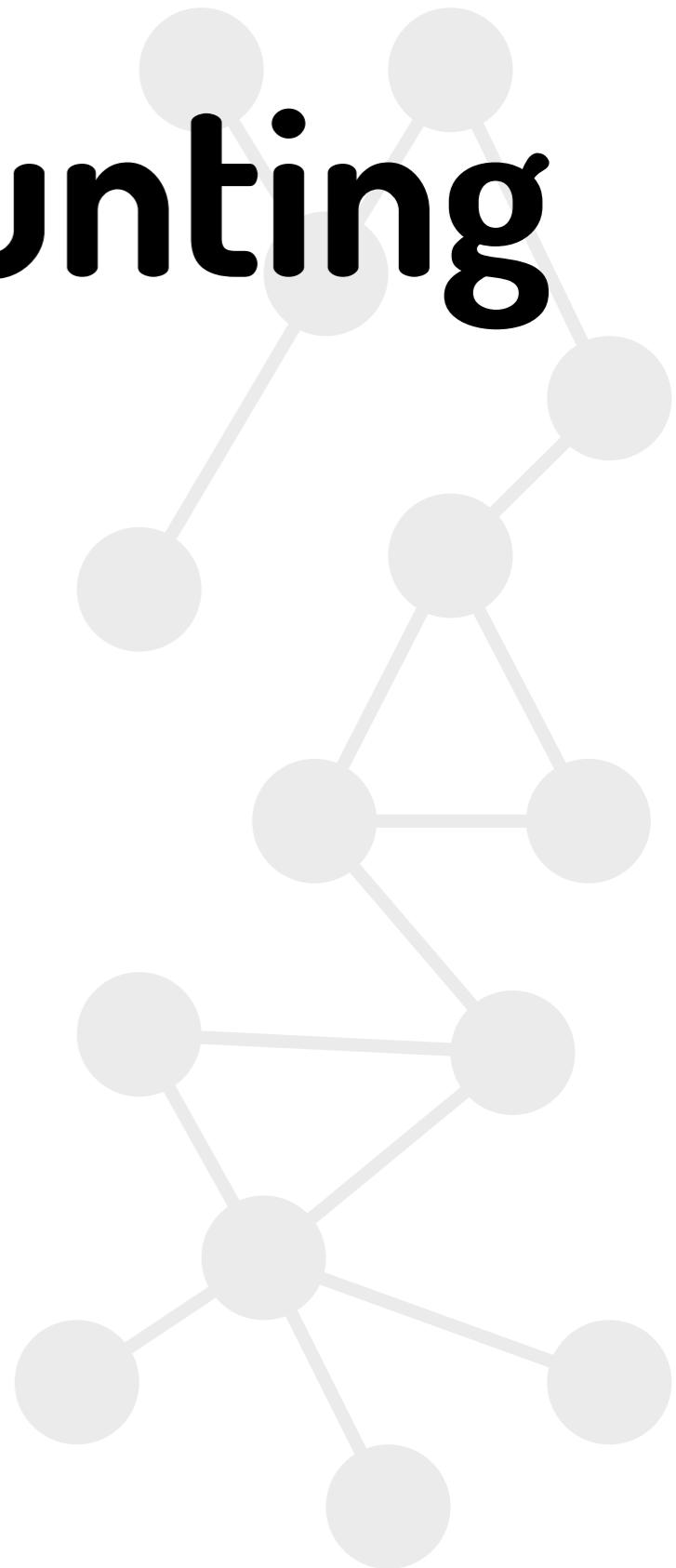


Hyperbolic discounting

**Classical
economics**
Reality
**(Behavioural
economics)**

$$\frac{1}{1+k}^t$$

$$\frac{1}{1+kt}$$



Learning

Agents have a **limited** or even a **wrong comprehension** of their environment

They master **only a subset of all the actions** that can be conceived in order to face a given situation

They have an **imprecise understanding of** their own **goals** and **preferences**.



Objects of Learning

Models of the world

Parameters within a given model

Actions

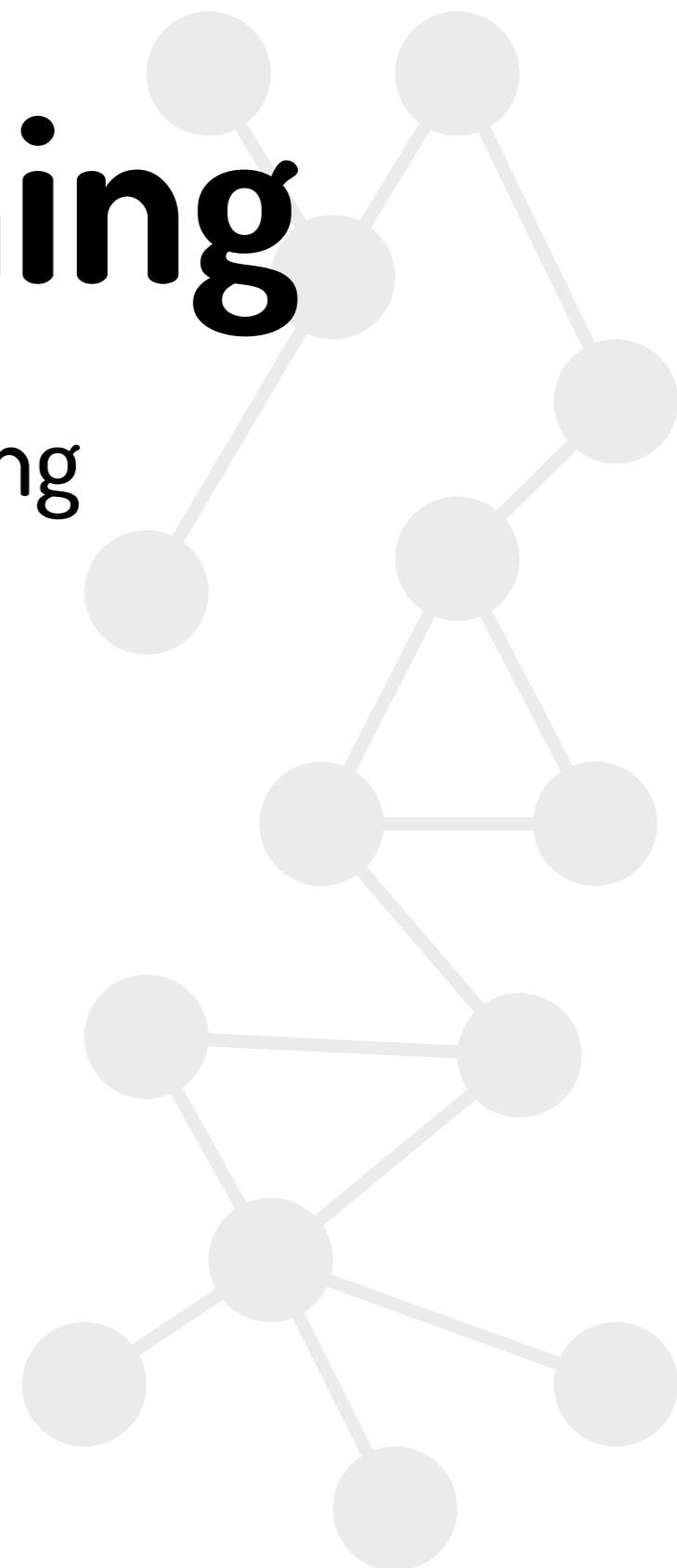
Realised outcomes



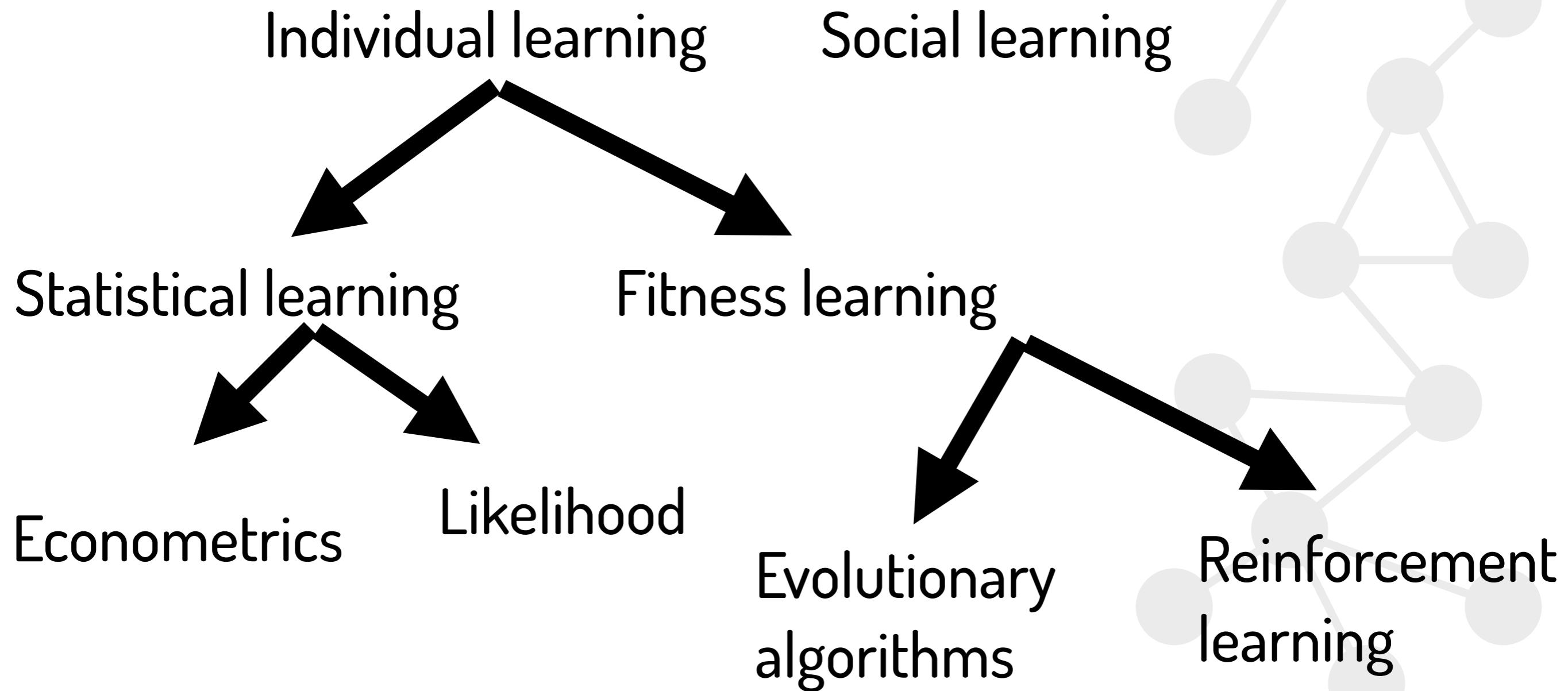
Types of Learning

Individual learning

Social learning



Types of Learning



Exercise

Can you name a situation where
you would need learning agents?



Summary

(How to design agents)

Foundations of **decision making**

Characteristics of **Individual behaviour** (bounded rationality)

Learning processes

